

PREFACE

Hardware Maintenance and Service is the publication used to help isolate and repair any failure of a field replaceable unit (FRU) in the IBM Personal Computer. Users should have training on the IBM Personal Computer and be familiar with the Triplet Model 310 Multimeter* (or equivalent).

“Introduction” provides a general description of the IBM Personal Computer and its options.

“Introduction to Diagnostics” gives an explanation of the three main diagnostic aids and contains the diagnostic menu reference.

“Problem Isolation Charts” (PICs) provide step-by-step instructions to help the user isolate the failing FRU.

“Removal/Replacement and Adjustments” provide all necessary information to complete the repair after the failing FRU is identified.

Personal Computer component locations are shown in “Locations.”

Switch settings are shown in “Switch Settings.”

IBM part numbers are in “Parts Catalog.”

Complete Personal Computer operating instructions are found in *Guide to Operations*, IBM item number 6025000. Detailed hardware design and interface information is found in *Technical Reference*, IBM item number 6025005.

*Manufactured by Triplet Corporation, Bluffton, Ohio 45817

Notes:

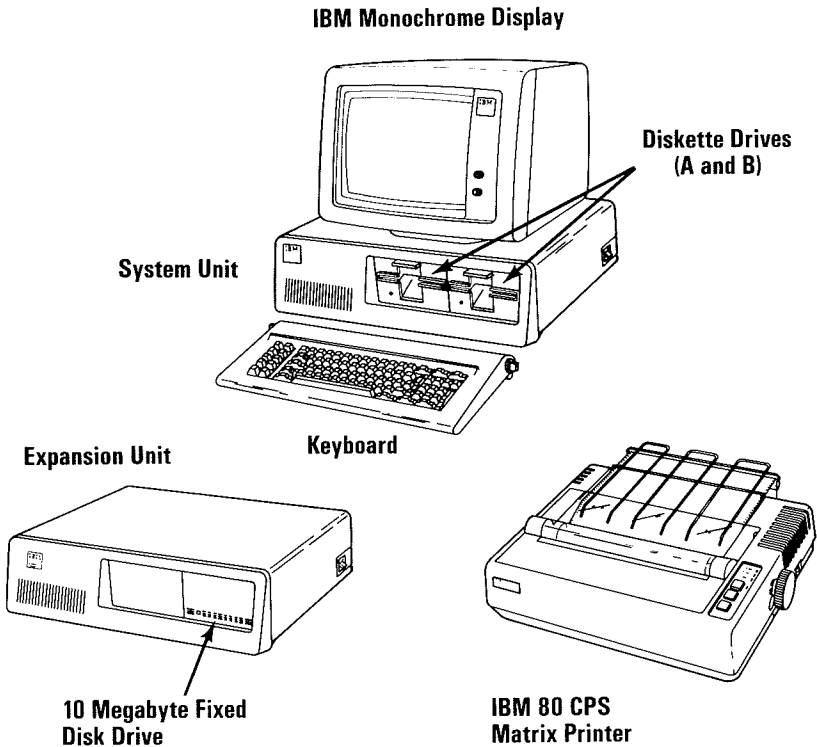
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SECTION 1. INTRODUCTION

The IBM Personal Computer is a powerful small computer, which offers a wide variety of options to give the user the ability to tailor his system to meet his needs now, and growth potential for the future.



The system unit contains the processor, has five expansion slots for optional adapters, and can house two optional diskette drives and adapters.

Input to the system unit is through an 83-key keyboard, which includes a numeric keypad and 10 function keys. The keyboard is connected to the system unit by a 6 foot coiled cable, which allows the keyboard to be moved to a comfortable operating position.

The expansion unit is designed to upgrade the user's system. It contains a fixed disk drive, a fixed disk adapter and data/control cable, a receiver card and expansion slots for up to six user options. An expansion unit cable and extender card (to be installed in the system unit) are provided with the expansion unit option. A second fixed disk drive may be installed in the expansion unit.

Other options available for the IBM Personal Computer are:

- IBM Monochrome Display
- Color/Graphics Monitor Adapter
- IBM Color Display
- IBM Math Coprocessor
- Asynchronous Communications Adapter
- Alternate Asynchronous Communications Adapter
- Binary Synchronous Communications (BSC) Adapter
- Alternate Binary Synchronous Communications Adapter
- Synchronous Data Link Control (SDLC) Adapter
- Game Control Adapter
- Memory Expansion Options
- Prototype Card
- Printer Adapter
- IBM 80 CPS Matrix Printer
- IBM 80 CPS Graphics Printer

SECTION 2. INTRODUCTION TO DIAGNOSTICS

This section gives an explanation of three main diagnostic aids: the power-on self-test (POST), advanced diagnostics, and problem isolation charts (PICs). It is not necessary to go through this section on every service call, but it is a useful reference until you have a good command of the use of POST, advanced diagnostics, and PICs.

Power-On Self-Test

It is recommended that you go through POST and then advanced diagnostics each time you service the Personal Computer or add an option to it.

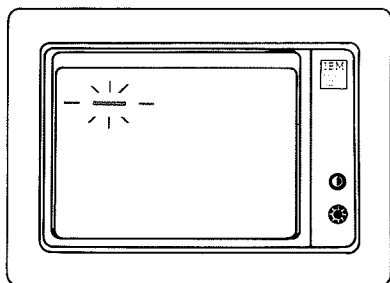
The power-on self-test runs each time the system unit is powered on. Depending on the amount of memory installed, the POST takes 13 to 90 seconds to complete.

Short tests check the following areas:

- System board
- Memory
- Primary display
- Keyboard
- Diskette drive
- Fixed disk drive
- Expansion unit

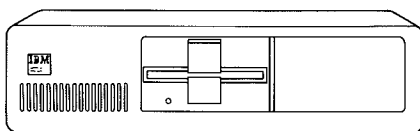
1. If attached, set the expansion unit Power switch to On first.
2. Set the system unit Power switch to On.
3. Turn the brightness and contrast knobs fully clockwise.
4. A cursor appears on the display in approximately 4 seconds.
5. One short "beep" sounds after the POST.
6. The IBM Personal Computer BASIC screen will appear (if a diskette is not loaded or an operating system is not automatically loaded from a fixed disk drive).

1



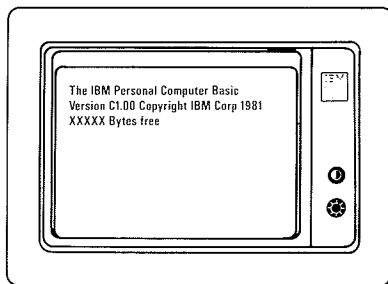
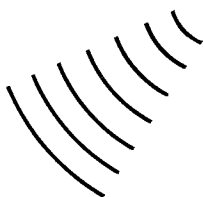
Blinking Cursor

2



One Short Beep

3



**IBM Personal Computer
Basic Screen**

Note: These three responses indicate POST completed successfully.

If the system unit fails to complete POST, you could receive an incorrect audio response, a blank screen, or an error message. These error codes may appear for only a short time at the end of POST. You should watch for these messages and make a note of them as soon as they appear. If multiple errors occur, you should troubleshoot the one that appears first.

POST Errors

Whenever a POST failure occurs, always make sure that all of the cables are properly connected and all switch settings are correct. Switch locations are in Section 4, "Locations" and switch settings are in Section 6, "Switch Settings."

The following is a list of some errors you can receive during POST:

- A blank display
- An incorrect audio response (no beep or more than one beep)
- An error message like:
 - 601
 - or XXXX 201 (X means any number could appear)
 - or 1701
 - or even a combination like:
 - 1801
 - 1701

Note: If you receive any error indications during or at the completion of POST, your next step will always be to note the error and then go to the "Start" page which is located in Section 3, page 3-2.

Problem Isolation Charts

How To Use



Always begin with “Start” on page 3-2.



START

This is the entry point for using all of the PICs. You may have an error code, an audio error during power-on self test (POST), an undetermined problem, or a problem related to one device. If an error code appears along with an audio error, disregard the audio error and go to the appropriate PIC that corresponds to the error code.

Depending on your failure indications, “Start” directs you to one of the PICs.



Printer

System Board

You have entered this PIC because you were unable to receive message, IXX.

unit (and expansion unit if attached)

Power

You have entered this PIC because you were unable to complete the POST or you have an intermittent problem. It is assumed that you have a functional wall outlet and line cord.

1. Set the Power switch on the system and expansion unit to OFF. Verify forms. Move print head to left. Press Power switch to ON, and Online lights on?

100.2", "Control"

These PICs will guide you through a series of steps and the use of the Advanced Diagnostics diskette to identify the failing FRU.

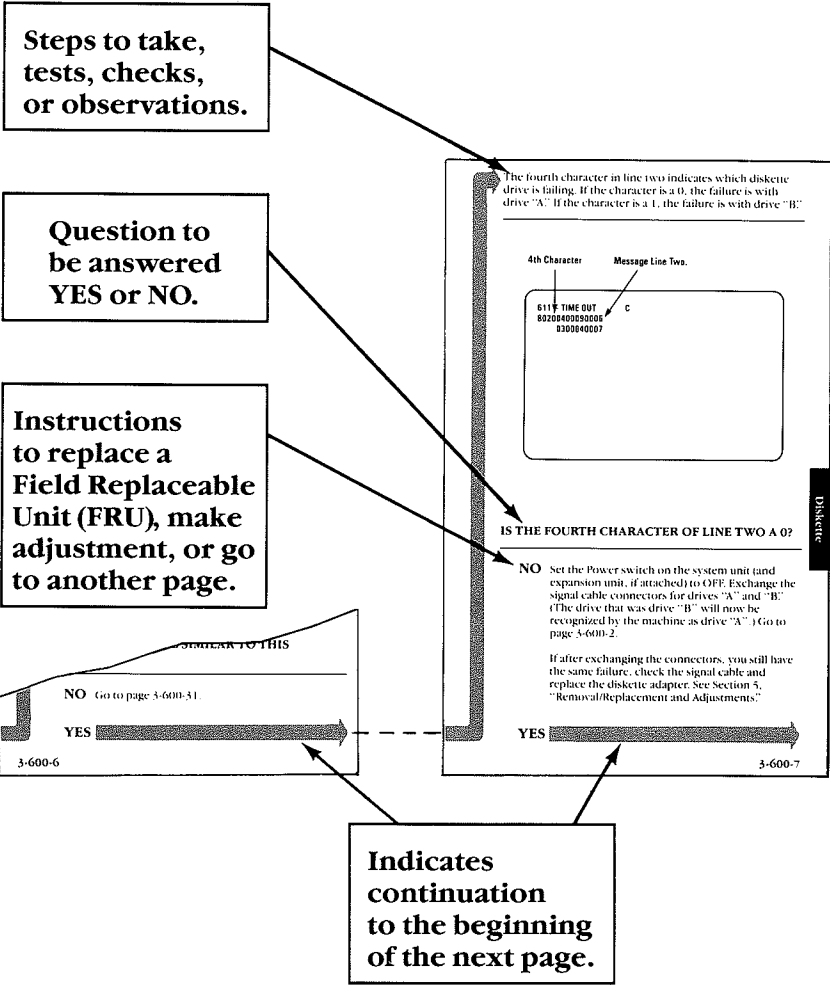


**SECTION 5. REMOVAL/
REPLACEMENT AND
ADJUSTMENTS**

To use this section, locate the assembly you are servicing in the section index. Each removal, replacement, or adjustment for a FRU is listed in the index.

The “Removal/Replacement and Adjustments” section will guide you to complete the repair.

The example below shows a representative page from the PICs.



Advanced Diagnostics

There are two ways to load the advanced diagnostics.

If your Personal Computer is off:

1. Insert the Advanced Diagnostics diskette in drive A and close the diskette drive door.
2. Set the expansion unit's (if attached) Power switch to On.
3. Set the system unit's Power switch to On.
4. After POST, the Advanced Diagnostics will load and Menu 1 will appear on the display.

If your Personal Computer is on:

1. Insert the Advanced Diagnostics diskette in drive A and close the diskette drive door.
2. Press and hold **Ctrl** and **Alt** then press **Del**. Release all three keys.
3. The Advanced Diagnostics will load and Menu 1 will appear on the display.

Special Key Functions

Special key functions for the Advanced Diagnostics are:

F7 Moves display message to the left (color graphics only).

F8 Moves display message to the right (color graphics only).

Ctrl + P – Directs screen output to printer.

Ctrl + N – Cancels output to printer.

Ctrl + C – Stops diagnostics and returns to Menu 2.

Ctrl + S – Stops diagnostics. Continues when any key is pressed.

Diagnostic Menu Reference

SELECT AN OPTION

0-~~RUN DIAGNOSTIC ROUTINES~~
1-FORMAT DISKETTE
2-COPY DISKETTE
3-PREPARE SYSTEM FOR RELOCATION
9-EXIT TO SYSTEM DISKETTE
ENTER THE ACTION DESIRED
? 0 _

Menu 1

NOTE: The "S" in front of each option will be an "E" if that option is installed in the expansion unit.

1-S SYSTEM BOARD
18-S EXPANSION OPTION
2-S XXXKB MEMORY
3-S KEYBOARD
4-S MONOCHROME & PRINTER ADAPTER
5-S COLOR GRAPHICS MONITOR ADAPTER
6-S X DISKETTE DRIVE(S) & ADAPTER
7-S MATH COPROCESSOR
9-S PRINTER ADAPTER
11-S ASYNC COMMUNICATIONS ADAPTER
12-S ALT ASYNC COMMUNICATIONS ADPT
13-S GAME CONTROL ADAPTER
15-S SDLC COMMUNICATIONS ADAPTER
17-E X FIXED DISK DRIVE(S) & ADAPTER
20-S BSC ADAPTER
21-S ALT BSC ADAPTER
14-S MATRIX PRINTER

IS THE LIST CORRECT (Y/N)?

Menu 2

SYSTEM CHECKOUT

0-~~RUN TESTS ONE TIME~~
1-~~RUN TESTS MULTIPLE TIMES~~
2-~~LOG UTILITIES~~
9-EXIT DIAGNOSTIC ROUTINES
ENTER THE ACTION DESIRED
? _

Menu 3

1-S SYSTEM BOARD
18-S EXPANSION OPTION
2-S XXXKB MEMORY
3-S KEYBOARD
4-S MONOCHROME & PRINTER ADAPTER
5-S COLOR GRAPHICS MONITOR ADAPTER
6-S X DISKETTE DRIVE(S) & ADAPTER
7-S MATH COPROCESSOR
9-S PRINTER ADAPTER
11-S ASYNC COMMUNICATIONS ADAPTER
12-S ALT ASYNC COMMUNICATIONS ADPT
13-S GAME CONTROL ADAPTER
15-S SDLC COMMUNICATIONS ADAPTER
17-E X FIXED DISK DRIVE(S) & ADAPTER
20-S BSC ADAPTER
21-S ALT BSC ADAPTER
14-S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
? _

Menu 4

LOG UTILITIES

0-START ERROR LOG
1-STOP ERROR LOG
2-LIST LOG
3-SET TIME OF DAY
4-DISPLAY TIME OF DAY
9-RETURN FROM UTILITIES
ENTER THE ACTION DESIRED
? _

Menu 5

Menu 1

SELECT AN OPTION
0 – RUN DIAGNOSTIC ROUTINES
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR RELOCATION
9 – EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

- 0 – **RUN DIAGNOSTIC ROUTINES** – Starts the system checkout procedure (goes to Menu 2).
- 1 – **FORMAT DISKETTE** – Formats a diskette for use with diagnostics only.
- 2 – **COPY DISKETTE** – Copies Advanced Diagnostics diskette to another diskette.
- 3 – **PREPARE SYSTEM FOR RELOCATION** – Positions the fixed disk drive head in preparation to move the system.
- 9 – **EXIT TO SYSTEM DISKETTE** – Loads the program from the diskette in drive A.

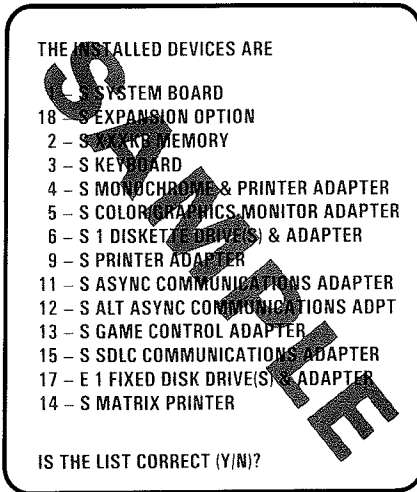
Note: If the monochrome display adapter and a color adapter are installed, the screen also displays:

“IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N)?”

Menu 2

The path to Menu 2 is:

- Menu 1



Y – Goes to System Checkout (Menu 3).

N – Allows you to add or delete items from the installed devices list.

Note: If you enter “N” the screen will display an installed devices list error “199.” Disregard that error at this time and continue with adding or deleting the option(s) in question.

After attempting to add or delete, answer “yes” to the installed devices list question, to continue running the diagnostics. Even if you are unable to correct the list, you still must answer “yes” to continue.

Menu 3

The path to Menu 3 is:

- Menu 1
- Menu 2

SYSTEM CHECKOUT

- 0 – RUN TESTS ONE TIME
- 1 – RUN TESTS MULTIPLE TIMES
- 2 – LOG UTILITIES
- 9 – EXIT DIAGNOSTIC ROUTINES

ENTER THE ACTION DESIRED

0 – RUN TESTS ONE TIME – Runs the diagnostic test(s) once (goes to Menu 4).

1 – RUN TESTS MULTIPLE TIMES – Runs the diagnostic test(s) one or more times without operator intervention (goes to Menu 4).

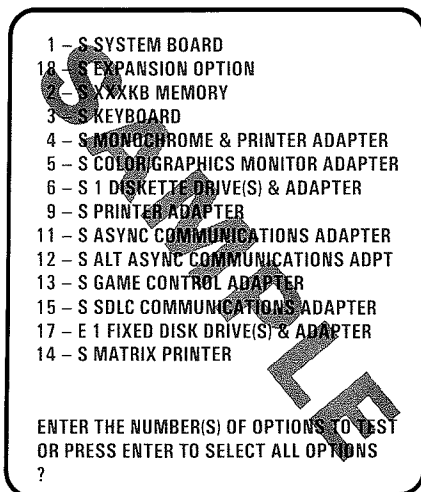
2 – LOG UTILITIES – Allows you to use the error log and time of day functions (goes to Menu 5).

9 – EXIT DIAGNOSTICS ROUTINE – Returns to Menu 1.

Menu 4

The path to Menu 4 is:

- Menu 1
- Menu 2
- Menu 3

A screenshot of a computer menu interface. It features a list of 18 numbered options, each preceded by a letter 'S' or 'E'. The options are: 1 - S SYSTEM BOARD, 18 - S EXPANSION OPTION, 2 - S XXXKB MEMORY, 3 - S KEYBOARD, 4 - S MONOCHROME & PRINTER ADAPTER, 5 - S COLOR/GRAPHICS MONITOR ADAPTER, 6 - S 1 DISKETTE DRIVE(S) & ADAPTER, 9 - S PRINTER ADAPTER, 11 - S ASYNC COMMUNICATIONS ADAPTER, 12 - S ALT ASYNC COMMUNICATIONS ADPT, 13 - S GAME CONTROL ADAPTER, 15 - S SDLC COMMUNICATIONS ADAPTER, 17 - E 1 FIXED DISK DRIVE(S) & ADAPTER, and 14 - S MATRIX PRINTER. At the bottom of the list, there is a prompt: 'ENTER THE NUMBER(S) OF OPTIONS TO TEST OR PRESS ENTER TO SELECT ALL OPTIONS' followed by a question mark. A large, semi-transparent watermark with the word 'SAMPLE' is oriented diagonally across the center of the menu box.

1 - S SYSTEM BOARD
18 - S EXPANSION OPTION
2 - S XXXKB MEMORY
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
5 - S COLOR/GRAPHICS MONITOR ADAPTER
6 - S 1 DISKETTE DRIVE(S) & ADAPTER
9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
12 - S ALT ASYNC COMMUNICATIONS ADPT
13 - S GAME CONTROL ADAPTER
15 - S SDLC COMMUNICATIONS ADAPTER
17 - E 1 FIXED DISK DRIVE(S) & ADAPTER
14 - S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS
?

Select the options to be tested by entering the corresponding numbers, separated by commas or spaces. To select all options, press Enter.

- 1 - **SYSTEM BOARD** - Tests key elements of the system board.
- 18 - **EXPANSION OPTION** - Tests expansion unit, cable, extender card, and receiver card. The expansion unit is tested second because it is actually an extension of the system board bus.
- 2 - **XXXKB MEMORY** - Tests all installed random access memory and verifies correct addressing.
- 3 - **KEYBOARD** - Tests all key positions, keyboard cable, and the reset function.
- 4 - **MONOCHROME & PRINTER ADAPTER** - Selects monochrome and printer adapter menu (Menu 6).
- 5 - **COLOR/GRAPHICS ADAPTER** - Selects color/graphics adapter menu (Menu 7).

- 6 – X DISKETTE DRIVE(S) & ADAPTER** – Selects diskette drive adapter menu (Menu 8).
- 7 – MATH COPROCESSOR** – Tests math coprocessor.
- 9 – PRINTER ADAPTER** – Tests printer adapter with printer adapter wrap plug (IBM Part 8529228).
- 11 – ASYNC COMMUNICATIONS ADAPTER** – Tests asynchronous communications adapter with wrap plug (IBM Part 8529280).
- 12 – ALT ASYNC COMMUNICATIONS ADPT** – Tests alternate asynchronous communications adapter with wrap plug (IBM 8529280).
- 13 – GAME CONTROL ADAPTER** – Tests game control adapter. Joy sticks are required to run test.
- 15 – SDLC COMMUNICATIONS ADAPTER** – Tests the SDLC adapter and the IBM Communications Adapter Cable, if attached, with wrap plug (IBM Part 8529280).
- 17 – X FIXED DISK DRIVE(S) AND ADAPTER** – Tests the fixed disk drive(s) and adapter (Menu 9).
- 20 – BSC ADAPTER** – Tests the binary synchronous communications adapter and the IBM Communications Adapter Cable, if attached, with wrap plug (IBM Part 8529280).
- 21 – ALT BSC ADAPTER** – Tests the alternate binary synchronous communications adapter and the IBM Communications Adapter Cable, if attached, with wrap plug (IBM Part 8529280).
- 14 – MATRIX PRINTER** – Tests the printer cable and prints character sets on the matrix printer.

Menu 5

The path to Menu 5 is:

- Menu 1
- Menu 2
- Menu 3

LOG UTILITIES

- 0 – START ERROR LOG
- 1 – STOP ERROR LOG
- 2 – LIST LOG
- 3 – SET TIME OF DAY
- 4 – DISPLAY TIME OF DAY
- 9 – RETURN FROM UTILITIES

ENTER THE ACTION DESIRED

- 0 – START ERROR LOG** – Starts a record of failures detected by diagnostic tests. You can choose to log to diskette or printer. If logging to diskette, use a copy of the Advanced Diagnostics that is not write protected.
- 1 – STOP ERROR LOG** – Stops recording failures detected by diagnostic tests.
- 2 – LIST LOG** – Lists logged failures from diskette to display.
- 3 – SET TIME OF DAY** – Directs user to set current time of day, using a 24 hour clock.
- 4 – DISPLAY TIME OF DAY** – If no time was set, displays elapsed time since diagnostic program was loaded.
- 9 – RETURN FROM UTILITIES** – Returns to system checkout (Menu 3).

Menu 6

The path to Menu 6A is:

- Menu 1
- Menu 2
- Menu 3
- Menu 4 (run tests once)

The path to Menu 6B is:

- Menu 1
- Menu 2
- Menu 3
- Menu 4 (run tests multiple times)

IBM MONOCHROME DISPLAY AND
PRINTER ADAPTER TEST
0 - DISPLAY ADAPTER TEST
1 - DISPLAY ATTRIBUTES
2 - CHARACTER SET
3 - 80X25 DISPLAY
4 - PRINTER ADAPTER TEST
9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
11 - VIDEO TEST
12 - SYNC TEST
ENTER NUMBER OF DESIRED ACTION

Menu 6A

CHOOSE OPTIONS FOR UNATTENDED MODE
IBM MONOCHROME DISPLAY AND
PRINTER ADAPTER TEST
0 - DISPLAY ADAPTER TEST
1 - DISPLAY ATTRIBUTES
2 - CHARACTER SET
3 - 80X25 DISPLAY
4 - PRINTER ADAPTER TEST
9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
ENTER NUMBERS SEPARATED BY COMMAS

Menu 6B

0 - DISPLAY ADAPTER TEST - Exercises the monochrome display adapter, tests memory, and checks for correct addressing.

1 - DISPLAY ATTRIBUTES - Exercises display attribute logic for intensity, reverse video, blinking, non-display, and underline modes.

2 - CHARACTER SET - Checks character ROM by writing all available characters to the screen.

3 - 80X25 DISPLAY - Fills screen with a ripple pattern of characters.

4 - PRINTER ADAPTER TEST - Checks the printer adapter portion of the monochrome display and printer adapter.

9 – EXIT TO MAIN MENU – Returns to Menu 3 or continues other tests.

10 – RUN ALL ABOVE TESTS – Runs tests 0, 1, 2, 3, and 4.

*** 11 – VIDEO TEST** – Used for measurements of voltage levels on the video, intensity, and composite output signals.

*** 12 – SYNC TEST** – Used for voltage measurements of the horizontal and vertical sync outputs.

Note: The display cable must be disconnected before running the sync test due to the change in sync frequency.

*Section 3, “Problem Isolation,” gives instructions for measuring these voltages.

Menu 7

The path to Menu 7A is:

- Menu 1
- Menu 2
- Menu 3
- Menu 4 (run tests once)

The path to Menu 7B is:

- Menu 1
- Menu 2
- Menu 3
- Menu 4 (run tests multiple times)

COLOR/GRAPHICS MONITOR ADAPTER TEST
0 - DISPLAY ADAPTER TEST
1 - DISPLAY ATTRIBUTES
2 - CHARACTER SET
3 - 80X25 DISPLAY
4 - 40X25 DISPLAY
5 - 320X200 GRAPHICS
6 - 640X200 GRAPHICS
7 - LIGHT PEN TEST
8 - SCREEN PAGING
9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
11 - VIDEO TEST
12 - SYNC TEST
ENTER NUMBER OF DESIRED ACTION

Menu 7A

CHOOSE OPTIONS FOR UNATTENDED MODE
COLOR/GRAPHICS MONITOR ADAPTER TEST
0 - DISPLAY ADAPTER TEST
1 - DISPLAY ATTRIBUTES
2 - CHARACTER SET
3 - 80X25 DISPLAY
4 - 40X25 DISPLAY
5 - 320X200 GRAPHICS
6 - 640X200 GRAPHICS
8 - SCREEN PAGING
9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
ENTER NUMBERS SEPARATED BY COMMAS

Menu 7B

Compare test displays to examples in Section 3, "Problem Isolation."

- 0 - **DISPLAY ADAPTER TEST** - Exercises the color display adapter, tests memory, and checks for correct addressing.
- 1 - **DISPLAY ATTRIBUTES** - Exercises display attribute logic for intensity, reverse video, blinking, non-display, and underline modes.
- 2 - **CHARACTER SET** - Checks character ROM by writing all available characters to the screen.
- 3 - **80X25 DISPLAY** - Fills screen with a ripple pattern of characters, using the 80x25 mode.
- 4 - **40X25 DISPLAY** - Fills the screen with a ripple pattern of characters with an intensified white border, using the 40x25 mode.

- 5 – **320X200 GRAPHICS** – Exercises the 320x200 graphics mode. Also, illustrates color set 0 and color set 1.
 - 6 – **640X200 GRAPHICS** – Exercises the 640x200 mode.
 - 7 – **LIGHT PEN TEST** – Checks light pen and related circuitry on the adapter.
 - 8 – **SCREEN PAGING** – Exercises the addressing circuitry from the video controller chip to the adapter memory.
 - 9 – **EXIT TO MAIN MENU** – Returns to Menu 3 or continues other tests.
 - 10 – **RUN ALL ABOVE TESTS** – Runs Tests 0, 1, 2, 3, 4, 5, 6, 7, and 8.
 - * 11 – **VIDEO TEST** – Used for measurements of voltage levels on the video, intensity, and composite output signals.
 - * 12 – **SYNC TEST** – Used for voltage measurements of the horizontal and vertical sync outputs.
- Note:** The display cable must be disconnected before running the sync test due to the change in sync frequency.

*Section 3, "Problem Isolation," gives instructions for measuring these voltages.

Menu 8

The path to Menu 8 is:

- Menu 1
- Menu 2
- Menu 3
- Menu 4

TESTING – 1 DISKETTE DRIVE(S) & ADAPTER

DISKETTE DIAGNOSTIC MENU

OPTION	DRIVE
1 – SEQUENTIAL ACCESS	ONE DRIVE
2 – RANDOM SEEK	ONE DRIVE
3 – VERIFY DISKETTE	ONE DRIVE
4 – SPEED TEST	ONE DRIVE
9 – RETURN TO CONTROL PROGRAM	

FOR OPTION 9

ENTER "9" AND "ENTER"

FOR OTHER OPTIONS (1 THRU 4)

ENTER OPTION, DRIVE AND "ENTER"

- 1 – SEQUENTIAL ACCESS ONE DRIVE** – Tests the basic diskette operations along with a sequential write, read, and compare of data to all sectors of the diskette.
- 2 – RANDOM SEEK ONE DRIVE** – Tests the basic diskette operations along with a series of 50 random seeks each followed by a write, read, and compare of data.
- 3 – VERIFY DISKETTE ONE DRIVE** – Verifies each sector, and also verifies that data can be accessed without an error.
- 4 – SPEED TEST ONE DRIVE** – Measures the time for one revolution of the diskette. The range is from 198 to 202 milliseconds.
- 9 – RETURN TO CONTROL PROGRAM** – Returns to system checkout (Menu 3) or continues other tests.

Menu 9

The path to Menu 9 is:

- Menu 1
- Menu 2
- Menu 3
- Menu 4 (run tests once)

ENTER THE ACTION DESIRED
TESTING – 2 FIXED DISK DRIVE(S) & ADAPTER

- 0 – RUN FIXED DISK TEST
- 1 – RUN MEASUREMENTS TEST
- 2 – FORMAT FIXED DISK
- 9 – EXIT FIXED DISK TESTS

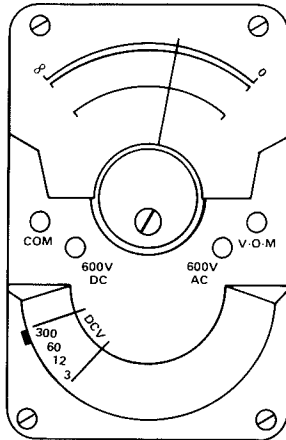
ENTER THE ACTION DESIRED ?

- 0 – **RUN FIXED DISK TEST** – Tests the fixed disk adapter and fixed disk drive (C or D) read and write operation.
- 1 – **RUN MEASUREMENTS TEST** – Used for measuring voltage levels on selected test points.
- 2 – **FORMAT FIXED DISK** – Formats the fixed disk drive. All data on the fixed disk drive is destroyed when this option is selected.
- 9 – **EXIT FIXED DISK TESTS** – Returns to System Checkout (Menu 3).

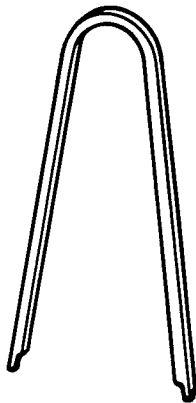
Special Tools

The following special tools are required to service the IBM Personal Computer.

- A. A meter similar to the Triplet Model 310*.



- B. A tweezer-type module puller similar to the one shown below. (Used for removal of the 16K and 64K memory modules.)



* Manufactured by the Triplet Corporation, Buffton, Ohio
45817

SECTION 3. PROBLEM ISOLATION

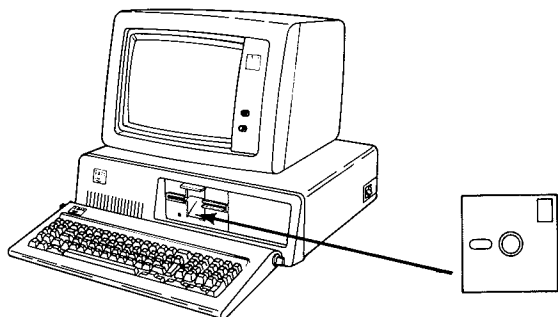
Start	3-2
Undetermined Problem	3-010-1
Power	3-020-1
System Board	3-100-1
Memory	3-200-1
Keyboard	3-300-1
Display (Monochrome)	3-400-1
Display (Color/Graphics)	3-500-1
Diskette Drive	3-600-1
Math Coprocessor	3-700-1
Reserved	3-800
Printer Adapter	3-900-1
Reserved	3-1000
Asynchronous Communications Adapter . . .	3-1100-1
Alternate Asynchronous Communications	
Adapter	3-1200-1
Game Control Adapter	3-1300-1
Printer	3-1400-1
Synchronous Data Link Adapter	3-1500-1
Reserved	3-1600-1
Fixed Disk Drive	3-1700-1
Expansion Unit	3-1800-1
Binary Synchronous	
Communications Adapter	3-2000-1
Alternate Binary Synchronous	
Communications Adapter	3-2100-1

START

This is the entry point for using all of the PICs. You may have an error code, an audio error during the power-on self-test (POST), an undetermined problem, or a problem related to one device. If an error code appears along with an audio error, disregard the audio error and go to the PIC that corresponds to the error code.

In order to continue:

1. You must have the following minimum components:
 - System Unit
 - Keyboard
 - Input device (diskette drive and Advanced Diagnostics diskette)
 - Output device (display)
2. Refer to Section 4, "Locations" and Section 6, "Switch Settings" and ensure that the switches in your machine are set correctly and that all option parameters have been met.



ARE THE OPTION PARAMETERS AND SWITCH SETTINGS CORRECT?

NO Install options to match the option parameters and set the switch settings to match the system configuration. If this did not correct the failure, continue to the next page.

YES



Choose the area in the left column that relates to your situation and follow the chart from there to the appropriate PIC.

Note: If the last two digits of a code are zeros, the device was tested successfully.

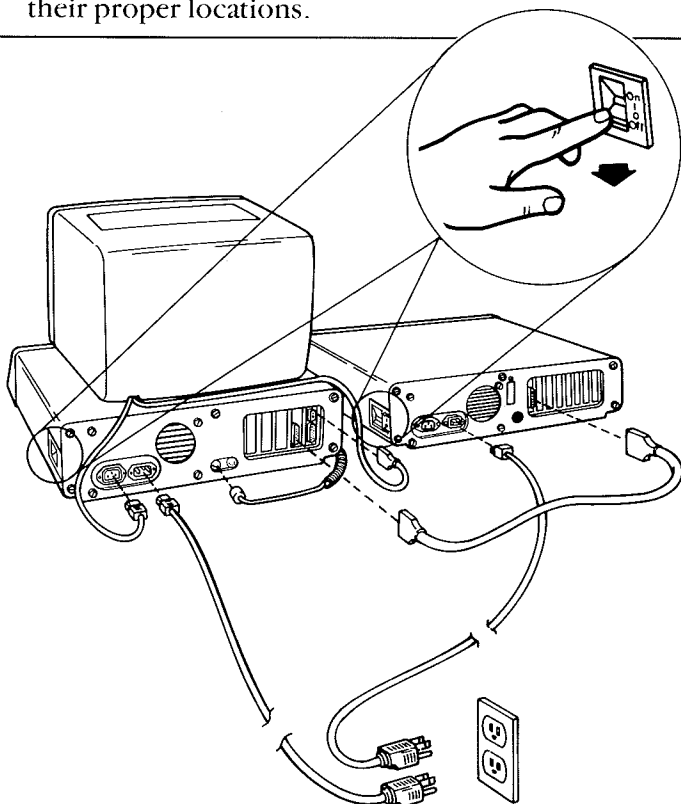
Problem Type	Error Code	PIC	Page
Audio Error Responses or Undetermined Problem		Undetermined Problem	3-010-1
	02X	Power	3-020-1
	1XX	System Board	3-100-1
	20X or XXXX XX20X	Memory	3-200-1
Error Code or Problem Related To One Device	30X or XX30X	Keyboard	3-300-1
	4XX	Display (Monochrome)	3-400-1
	5XX	Display (Color/Graphics)	3-500-1
	6XX	Diskette Drive	3-600-1
	7XX	Math Coprocessor	3-700-1
	9XX	Printer Adapter	3-900-1
	11XX	Asynchronous Comm.	3-1100-1
	12XX	Alt. Asynchronous Comm.	3-1200-1
	13XX	Game Control Adapter	3-1300-1
	14XX	Printer	3-1400-1
	15XX	SDLC Comm. Adapter	3-1500-1
	17XX	Fixed Disk Drive	3-1700-1
	18XX	Expansion Unit	3-1800-1
	20XX	BSC Adapter	3-2000-1
	21XX	Alt. BSC Adapter	3-2100-1

Go to the appropriate PIC.

Notes:

Undetermined Problem

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Remove all non-IBM devices and modified options (prototype card) except the display.
3. Turn the contrast and brightness controls fully clockwise (IBM displays only).
4. See that all connectors are installed securely and in their proper locations.




**ARE ALL CONNECTORS INSTALLED SECURELY
AND IN THE PROPER LOCATIONS?**

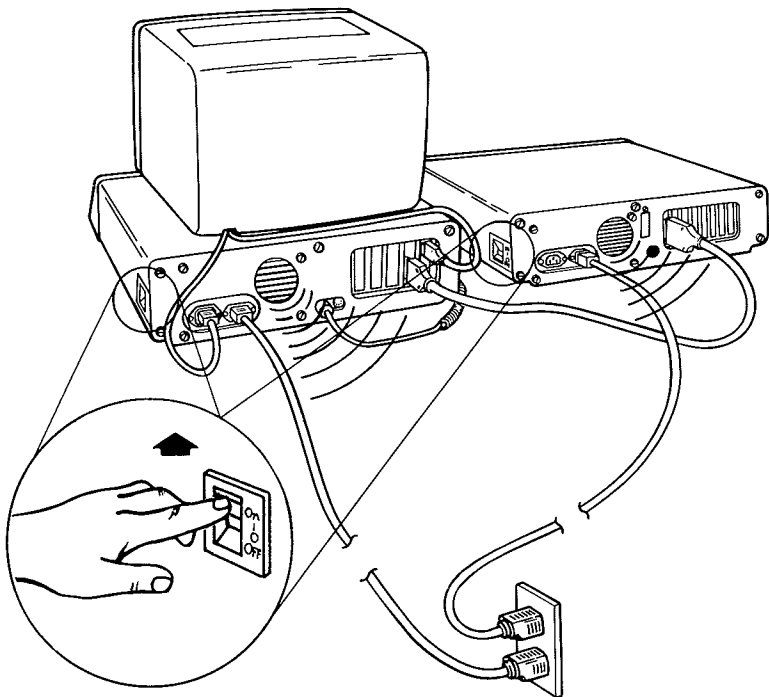
NO Reconnect or repair the connectors, If this has not corrected your failure, go to the next page.

YES



- 
1. Plug the system unit's (and expansion unit's) power cord(s) into a functioning, grounded wall outlet.
 2. Set the expansion unit (if attached) Power switch to On first.
 3. Set the system unit Power switch to On.

Note: If the system unit (and expansion unit) work properly except for the fan(s) not running, replace the power supply in the unit with the failing fan. See Section 5, "Removal/Replacement and Adjustments."



IS THE POWER SUPPLY FAN(S) RUNNING?

NO Check the system unit (and expansion unit) power cord(s) for continuity. Go to PIC 3-020-1, "Power."

YES 

When the IBM Personal Computer is powered on, the normal responses are:

1. While memory is tested, the cursor blinks in the top left corner of the screen.
2. One short beep is heard when POST completes.
3. The IBM Personal Computer Basic screen appears if a diskette is not loaded or an operating system is not automatically loaded from the fixed disk. (If the Advanced Diagnostics diskette is loaded, the first diagnostic menu should be displayed.)

When a failing system is powered on, there may be one or more of the following responses:

- A blank display
- An incorrect audio response
- An error message like:

601

or XXXX 201 (X means any number could appear)

or 1701


or even a combination like:

1801

1701

If a combination of error codes appear, always troubleshoot the error code that appears first.

CONTINUE



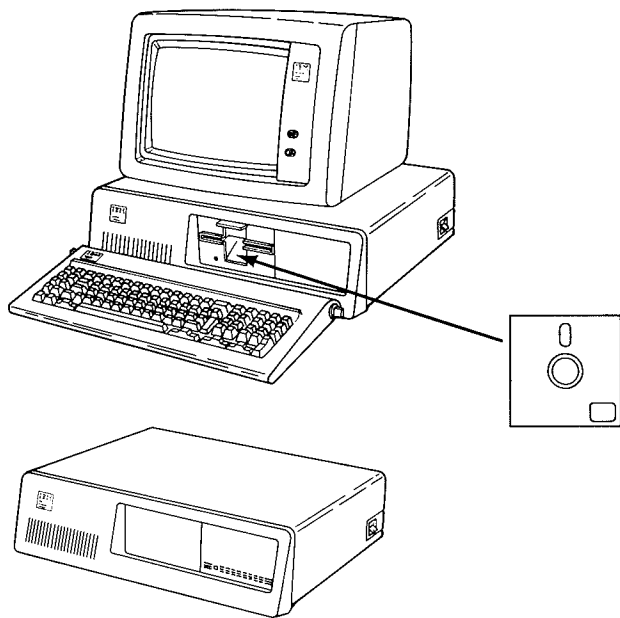
Error Indication	PIC Title	Page
No display and no beep	Power	3-020-1
Continuous beep	Power	3-020-1
Repeating short beeps	Power	3-020-1
1 long and 1 short beep	System Board	3-100-1
1 long and 2 short beeps	Display	3-400-1
1 short beep and blank or incorrect display	Display	3-400-1
1 short beep and Personal Computer BASIC statement	Diskette	3-600-1
101	System Board	3-100-1
131	System Board	3-100-1
201	Memory	3-200-1
301	Keyboard	3-300-1
xx301	Keyboard	3-300-1
601	Diskette	3-600-1
(XXXX201) Parity Check X	Memory	3-200-1
Parity Check X	Power	3-020-1
Keyboard not functional	Keyboard	3-300-1
Printer problems	Printer	3-1400-1
1701	Fixed Disk Drive	3-1700-1
1801	Expansion Unit	3-1800-1

DID YOU PERFORM THE STEPS ON THE PREVIOUS PAGES WITHOUT RECEIVING AN ERROR INDICATION THAT MATCHES ONE FROM THE TABLE ABOVE OR FROM THE TABLE ON PAGE 3-3?

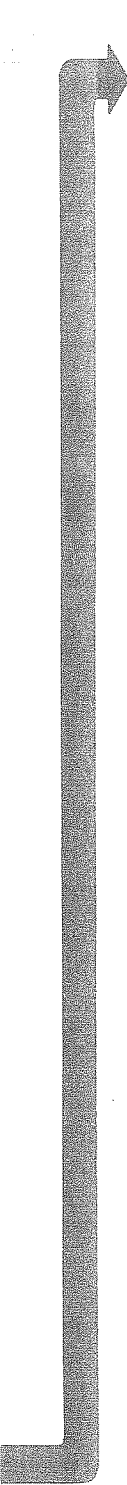
NO Go to the PIC that corresponds to your error indication.

YES 

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Insert the Advanced Diagnostics diskette into drive A and then close the drive's door.
 3. Power On all output devices (display, printer, etc.).
 4. Set the expansion unit (if attached) power switch to On first.
 5. Set the system unit power switch to On.
-



CONTINUE



Your Advanced Diagnostics diskette should be loaded and the first menu displayed.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C) Copyright IBM Corp 1981, 1982

SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? -  -

DID THE ABOVE MESSAGE APPEAR ON YOUR DISPLAY?

NO If you received an error code, go to the error table on page 3-3. If You did not receive an error code, go to page 3-010-11.

YES 

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip step 2 if you only have one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
-

THE INSTALLED DEVICES ARE

- 1 - S SYSTEM BOARD
- 18 - S EXPANSION OPTION
- 2 - S 128KB MEMORY
- 3 - S KEYBOARD
- 4 - S MONOCHROME & PRINTER ADAPTER
- 5 - S COLOR/GRAPHICS MONITOR ADAPTER
- 6 - S X DISKETTE DRIVE(S) AND ADAPTER
- 9 - S PRINTER ADAPTER
- 11 - S ASYNC COMMUNICATIONS ADAPTER
- 12 - S ALT ASYNC COMMUNICATIONS ADPT
- 13 - S GAME CONTROL ADAPTER
- 15 - S SDLC COMMUNICATIONS ADAPTER
- 17 - E X FIXED DISK DRIVE(S) AND ADAPTER
- 14 - S MATRIX PRINTER

IS THE LIST CORRECT (Y/N)? -  -

DID THE INSTALLED DEVICES MENU APPEAR ON YOUR DISPLAY?

NO Go to page 3-300-1, "Keyboard."

YES 

Press Y or N (IS THE LIST CORRECT (Y/N)?) then press Enter. (If the list is incorrect, follow the instructions on the display to correct the list before answering yes. Then make sure the switch settings are correct. See Section 6, "Switch Settings.")

The system checkout menu should be displayed.

SYSTEM CHECKOUT

- 0 – RUN TESTS ONE TIME
- 1 – RUN TESTS MULTIPLE TIMES
- 2 – LOG UTILITIES
- 9 – EXIT DIAGNOSTIC ROUTINES


ENTER THE ACTION DESIRED

? -  -

DO YOU NEED AN EXPLANATION OF THIS MENU?

NO Choose the type of test you would like to perform and go to page 3-010-10.

YES 

- 
- 0 – **RUN TESTS ONE TIME** – Runs a functional test of the installed devices.
 - 1 – **RUN TEST MULTIPLE TIMES** – Repeats the functional test as many times as you choose.
 - 2 – **UTILITIES** – The user has the option of choosing one of the following from a utilities program:
 - START ERROR LOG**
 - STOP ERROR LOG**
 - LIST LOG**
 - SET TIME OF DAY**
 - DISPLAY TIME OF DAY**
 - RETURN FROM UTILITIES**

START AND STOP ERROR LOG – Enables the user to log the errors that the diagnostics find. They can be output to diskette or printer.

LIST LOG – Will display logged errors contained on diskette.

SET TIME OF DAY – When the user selects this function and sets the time of day, the machine will keep track of the time and display it when asked to do so.

DISPLAY TIME OF DAY – Will display the time of day when asked. If the system has been turned off since the set time of day was used, the clock will restart at 0 when power is turned on.


The contents of the clock are constantly updated. The value is set to 0 by the POST which means the clock contains the time since POST was run. The contents may be modified by the set time of day function.

RETURN FROM UTILITIES – Allows the user to exit the utilities program and return to the main menu.


- 9 – **EXIT DIAGNOSTIC ROUTINES** – Allows the user to return to the first diagnostic menu.

You are now ready to choose the type of test to run. Follow the instructions on your screen.

CONTINUE 

- 
1. When you are ready to run the tests, press 0 or 1 and then press Enter. The menu shown below will appear on your screen.
 2. Follow the instructions on the screen to select the devices you wish to test, or press Enter to test all installed devices.
-

1 - S SYSTEM BOARD
18 - S EXPANSION OPTION
2 - S 128KB MEMORY
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
5 - S COLOR GRAPHICS MONITOR ADAPTER
6 - S DISKETTE DRIVE(S) AND ADAPTER
9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
12 - S ALT ASYNC COMMUNICATIONS ADPT
13 - S GAME CONTROL ADAPTER
15 - S SDLC COMMUNICATIONS ADAPTER
17 - E X FIXED DISK DRIVE(S) AND ADAPTER
14 - S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST OR PRESS ENTER TO
SELECT ALL OPTIONS ? -  -

DID YOU SELECT A SINGLE DEVICE TO TEST?

NO You selected more than one device to test. If you receive an error message, refer to the PIC indicated by the error message. If you do not receive an error message, you may have an intermittent problem. Start an error log and rerun the diagnostics to see if a failing symptom can be found.

YES Go to the appropriate PIC for the device you are testing.

You may have a failing coprocessor.


Power

**DO YOU HAVE A MATH COPROCESSOR
INSTALLED IN YOUR SYSTEM UNIT?**

NO Go to PIC 3-600-1.

YES



- 
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the Math Coprocessor. See Section 5, "Removal/Replacement and Adjustments."
 3. Set switch 2 on the system board to the on position. See Section 6, "Switch Settings."
 4. Insert your Advanced Diagnostics diskette in drive A.
 5. Set the Power switch on the expansion unit (if attached) and the system unit to On.
-

DID THE FAILING SYMPTOM REMAIN?

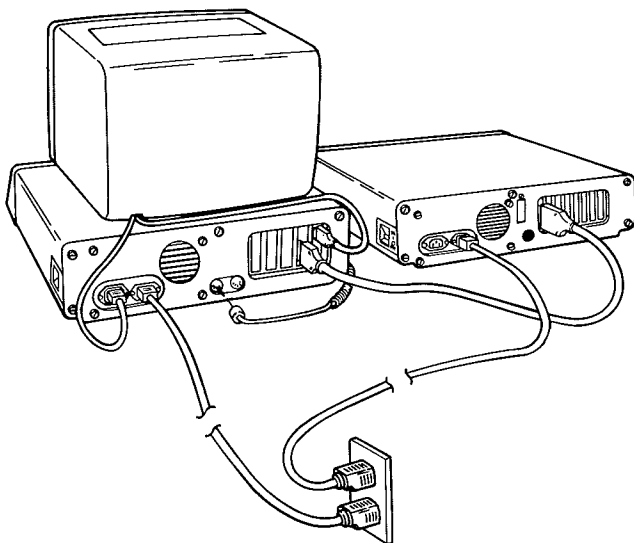
NO Replace the Math Coprocessor and the 8088 processor. See Section 5, "Removal/Replacement and Adjustments."

YES Reinstall your Math Coprocessor. See Section 5, "Removal/Replacement and Adjustments." Set switch 2 on the system board off. See Section 6, "Switch Settings." Go to PIC 3-600-1.

Power

You have entered this PIC because you were unable to complete POST or you have an intermittent problem. It is assumed you have a functional wall outlet and line cord.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Unplug system unit's (and expansion unit's) power cord(s) from the wall outlet.
3. Remove the keyboard and external devices attached to option adapters except the display and expansion unit.
4. Plug the power cord(s) into the wall outlet.
5. Set the Power switch on the expansion unit (if attached) and system unit to On.



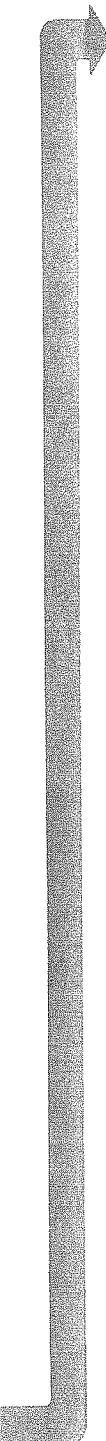
DID THE FAILING SYMPTOM REMAIN?

NO Reconnect the external devices to the system unit one at a time until the failing symptom returns: then replace the device causing the failure.

Note: Power must be turned off before connecting each device.

YES



- 
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Connect the keyboard to the rear of the system unit.
 3. Disconnect the expansion unit cable (if attached) at the system unit.
 4. Set the system unit Power switch to On. (If an 1801 error code is displayed at this time, disregard it.)
-

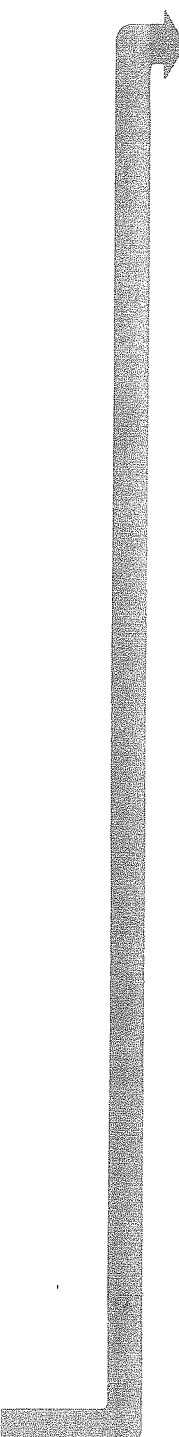
1801
XXX KB OK
ERROR.



DID THE FAILING SYMPTOM REMAIN?

NO Go to page 3-020-14.

YES 



You may have a failing option adapter. Follow the procedure listed below.

1. Set the Power switch on the system unit to Off.
 2. Remove one option adapter from the system board (do not remove the diskette adapter or display adapter until all other adapters have been removed; remove the display adapter last).
 3. Set the Power switch on the system unit to On.
 4. Repeat steps 1, 2, and 3 until the failing adapter is located or all adapters are removed.
-

Power

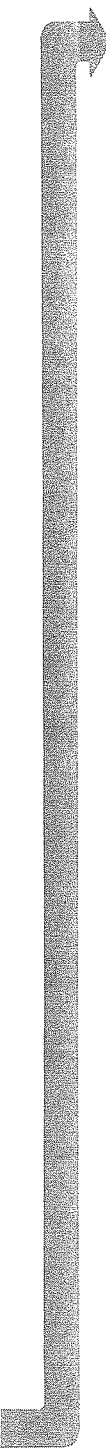
DID THE FAILING SYMPTOM REMAIN?

NO Replace the last device removed. See Section 5, "Removal/Replacement and Adjustments."

Note: Removal of the display adapter will normally result in one long and two short beeps.

YES



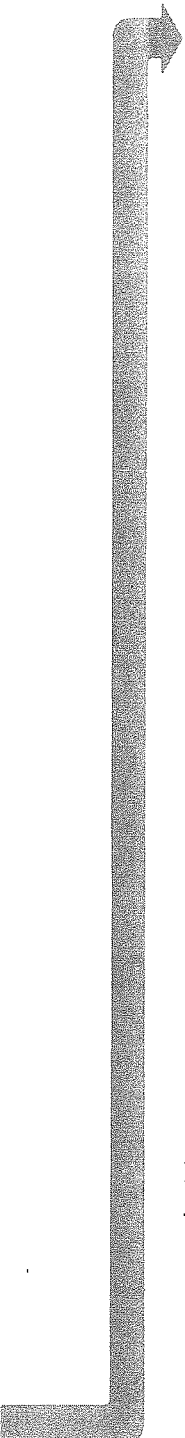


You may have a failing coprocessor.

**DO YOU HAVE A MATH COPROCESSOR
INSTALLED IN YOUR SYSTEM UNIT?**

NO Go to page 3-020-6.

YES 

- 
1. Set the Power switch on the system unit to Off.
 2. Remove the IBM Math Coprocessor from the system unit. See Section 5, "Removal/Replacement and Adjustments."
 3. Set the Power switch on the system unit to On.
-


Power

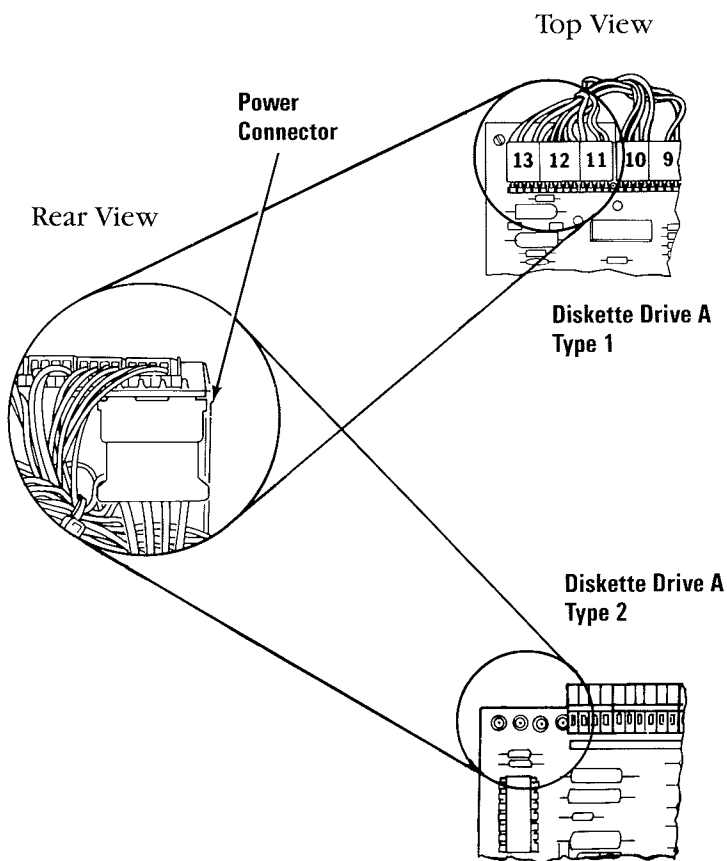
DID THE FAILING SYMPTOM REMAIN?

NO Replace the IBM Math Coprocessor and the 8088 Processor. See Section 5, "Removal/Replacement and Adjustments."

YES



- 
1. Set the Power switch on the system unit to Off.
 2. Remove the power connector from the system unit diskette drive A.
 3. Set the Power switch on the system unit to On.
-



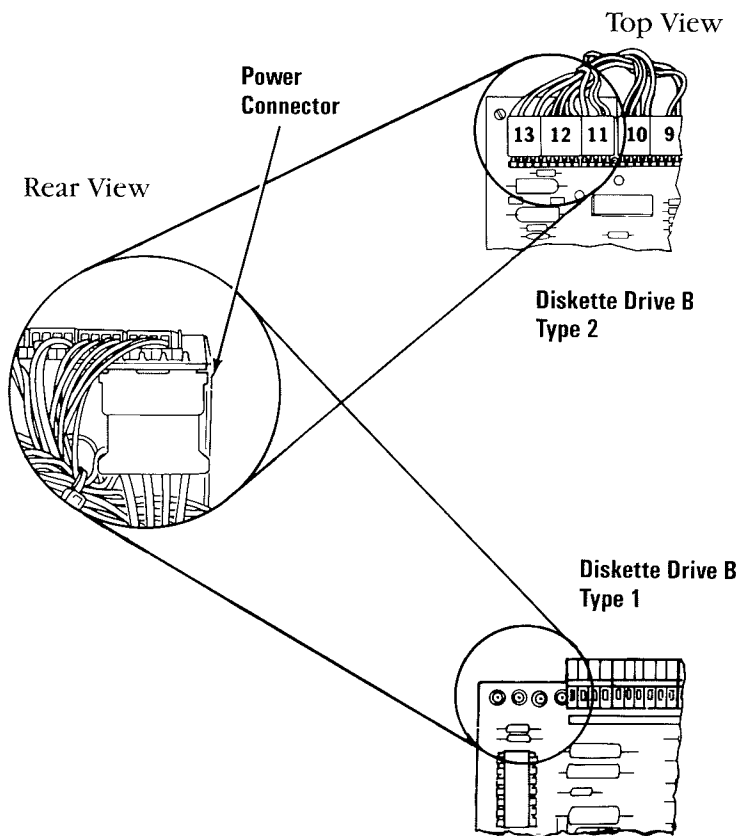
DID THE FAILING SYMPTOM REMAIN?

- NO** Replace:
1. Diskette drive logic printed circuit board.
 2. Diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Set the Power switch on the system unit to Off.
2. Remove the power connector from the system unit diskette drive B. Leave drive A disconnected.
3. Set the Power switch on the system unit to On.



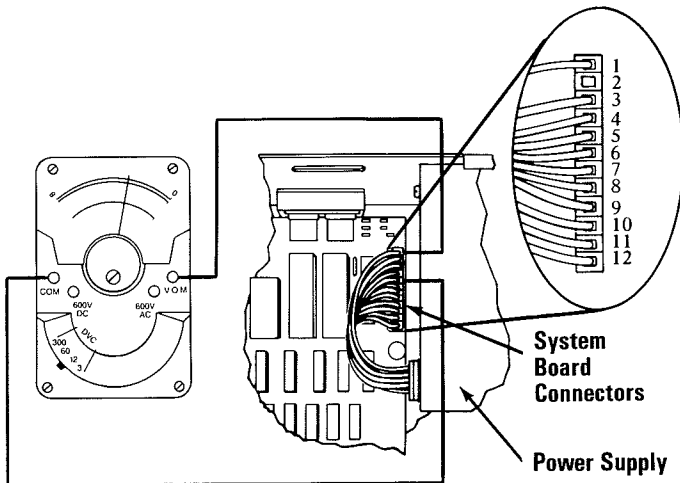
Power

DID THE FAILING SYMPTOM REMAIN?

NO Replace Diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Set your meter to the 12 Vdc scale. Connect the common lead to pin 5 and the voltage lead to pin 1 of the system board power connectors (refer to the diagram below).
 2. Set the Power switch on the system unit to On.
 3. Check for a voltage reading of 2.4 to 5.2 Vdc.
-



DO YOU HAVE 2.4 TO 5.2 VDC BETWEEN PINS 1 AND 5?

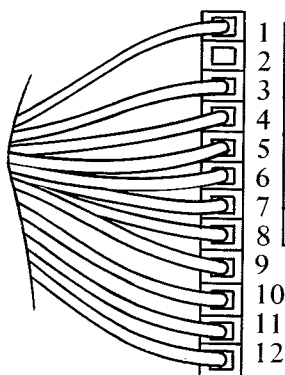
NO Go to page 3-020-13.

YES



Now check the rest of the power supply output voltages to the system board.

1. Leave your meter set on the 12 Vdc scale.
2. Check the system board power connectors for the voltages listed in the chart below.



Voltage Connectors			
Min Vdc	Max Vdc	-Lead	+ Lead
+ 4.8	+ 5.2	5	10
+ 4.5	+ 5.4	9	6
+ 11.5	+ 12.6	7	3
+ 10.8	+ 12.9	4	8

Power

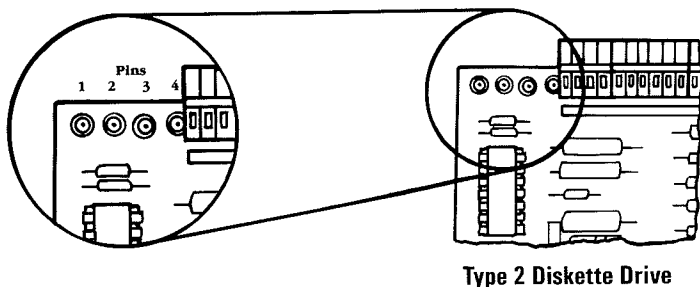
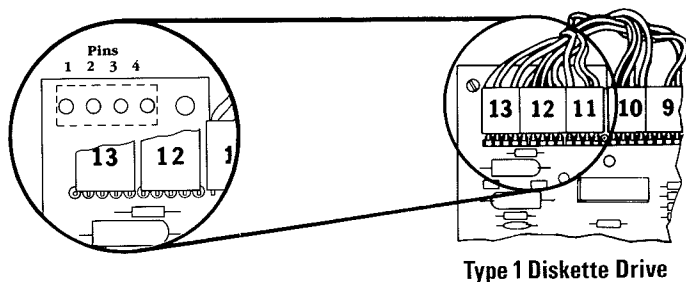
ARE THE SYSTEM BOARD POWER CONNECTOR VOLTAGES CORRECT?

NO Replace the power supply. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Set the Power switch on the system unit to Off.
2. Reconnect the diskette drive A power supply connector.
3. Set the Power switch on the system unit to On.
4. Refer to the diagram below for the proper voltage reading.

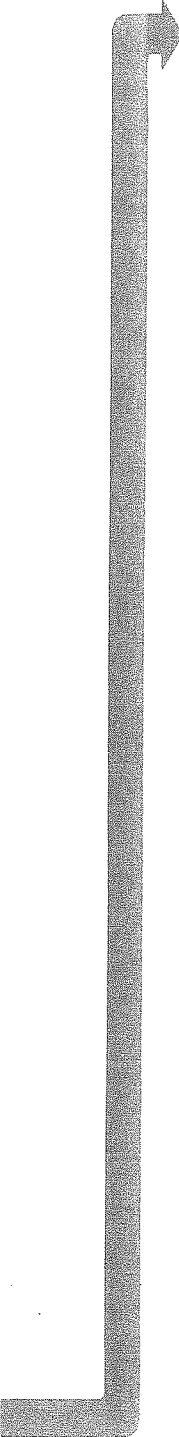
Diskette Drive Power Connector.			
Min Vdc	Max Vdc	-Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1



**WERE THE ABOVE VOLTAGE LEVELS PRESENT
BETWEEN THE PINS INDICATED?**

NO Replace the power supply. See Section 5,
"Removal/Replacement and Adjustments."

YES

- 
1. Set the Power switch on the system unit to Off.
 2. Reconnect the diskette drive B power supply connector.
 3. Set the Power switch on the system unit to On.
 4. Refer to the diagram below for the proper voltage readings.
-

Diskette Drive Power Connector			
Min Vdc	Max Vdc	- Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1

Power

**WERE THE ABOVE VOLTAGE LEVELS PRESENT
BETWEEN THE PINS INDICATED?**

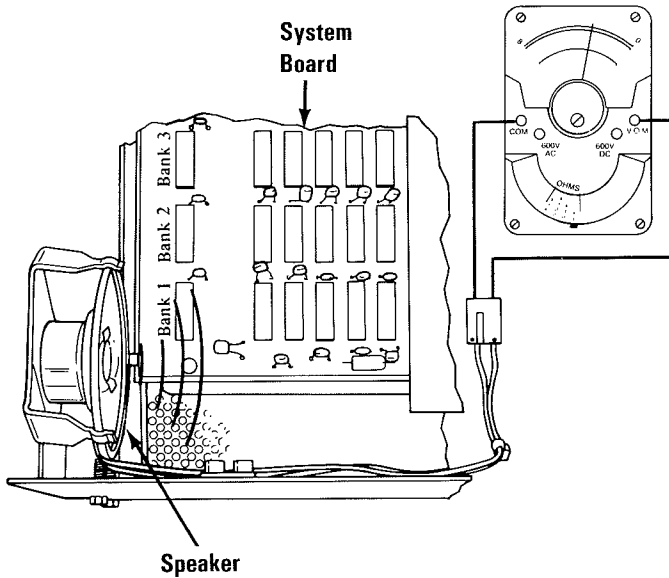
NO Replace the power supply. See Section 5,
"Removal/Replacement and Adjustments."

YES



Check the speaker circuit if you have no beep.

1. Set the Power switch on the system unit to Off.
 2. Set your meter to the Ohms (x1) scale.
 3. Remove the speaker connector from the system board.
 4. Connect the meter leads to the speaker as shown.
-



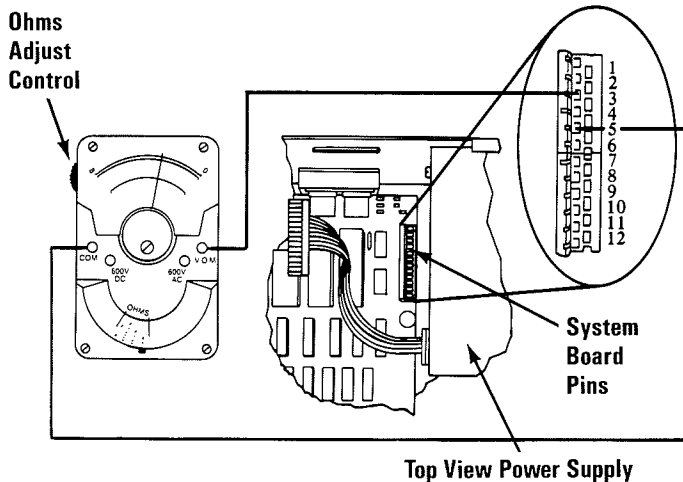
IS THERE CONTINUITY AT THE SPEAKER CONNECTOR?

NO Replace the speaker. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the system board. See Section 5, "Removal/Replacement and Adjustments."

1. Set the Power switch on the system unit to Off.
2. Set the meter switch on the Ohm's (x1) scale.
3. Remove the system board power connectors from the system board.
4. Remove all option adapters from the system board and take the resistance measurements on the system board pins as indicated on the chart below.

System Board Resistance Chart		
Min Resistance	COM Lead	VOM Lead
6 Ohms	5	3
48 Ohms	6	4
17 Ohms	7	9
.8 Ohms	8	10
.8 Ohms	8	11
.8 Ohms	8	12



ARE ANY OF THE RESISTANCE MEASUREMENTS BELOW THE MINIMUM SHOWN IN THE CHART?

NO You have a bad power supply. See Section 5, "Removal/Replacement and Adjustments."

YES You have a bad system board. See Section 5, "Removal/Replacement and Adjustments."

1. Set the Power switch on the system unit and expansion unit to Off.
2. Reconnect the expansion unit cable.
3. Insert the Advanced Diagnostics diskette in drive A.
4. Set the system unit Power switch to On.
5. When the 1801 error code is displayed at this time, disregard it.
6. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 7 if you only have one display adapter installed.)

7. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N)?) then press Enter.
 8. Press Y or N (IS THE LIST CORRECT (Y/N)?) then press Enter.
 9. Press 0 (RUN TESTS ONE TIME) then press Enter.
 10. Select 18 (EXPANSION OPTION) then press Enter.
-

TESTING – EXPANSION OPTION

X:XX:XX

ERROR – EXPANSION OPTION 1820 E

Data – XXXX = XX / XX SW = X

PRESS ENTER TO CONTINUE


? -  -

DID YOU GET AN 1820 ERROR CODE?

NO Replace the extender card. See Section 5,
“Removal/Replacement and Adjustments.”

YES





You may have a failing option adapter. Follow the procedure listed below.

1. Set the Power switch on the system unit and expansion unit to Off.
 2. Remove one option adapter from the expansion board (except the receiver card).
 3. Set the Power switch on the expansion unit and system unit to On.
 4. Repeat steps 1, 2 and 3 until the failing adapter is located or all adapters are removed.
-

DID THE FAILING SYMPTOM REMAIN?

NO Replace the last device removed. See Section 5, "Removal/Replacement and Adjustments."

Note: Removal of the display adapter will normally result in one long and two short beeps.

YES Replace the:

1. Receiver card.
2. Expansion board. See Section 5, "Removal/Replacement and Adjustments."

Notes:

System Board

You have entered this PIC because you were unable to complete the POST, or you have an error message, indicating a system board failure.


1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Insert the Advanced Diagnostics diskette in drive A.
 3. Set the Power switch on the expansion unit (if attached) and the system unit to On.
-

DID THE POST COMPLETE WITHOUT A 1XX ERROR MESSAGE?

NO Replace the system board. See Section 5,
"Removal/Replacement and Adjustments."

YES



- 
1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
(Skip step 2 if you have only one display adapter installed.)
 2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N)?) then press Enter.
 3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is incorrect, follow the instructions on your screen to correct the list before answering yes.)
 4. Press 1 (RUN TESTS MULTIPLE TIMES) then press Enter.
 5. Press 1 (SYSTEM BOARD) then press Enter.
 6. Select the number of times to run the test, then press Enter. (Press Enter to run tests continuously.)
 7. Press Y (WAIT EACH TIME AN ERROR OCCURS (Y/N) ?) then press Enter.
-




TESTING - SYSTEM BOARD
SYSTEM BOARD 100 S

DID YOU COMPLETE THE TEST WITHOUT A 1XX ERROR MESSAGE?

NO If you received a 1XX error message, replace your system board. See Section 5, "Removal/Replacement and Adjustments."

Note: A 199 error message indicates your options question was answered "No." Do not replace the system board. Refer to 3-010-1, "Undetermined Problem," and verify the installed devices.

YES 



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

Notes:

Memory

You have entered this PIC because you were unable to complete POST, or you have an error message indicating a memory failure.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Insert the Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit (if attached) and the system unit to On.
4. Watch the display carefully. An error code will only be displayed for about 1 second and may be replaced by a parity-check message.

You may receive an error message similar to the example shown below. If you do, write down the four-character error code (X can be any number or letter).



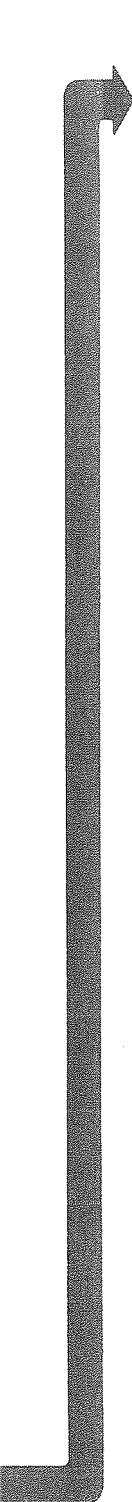
XXXX 201

DID POST COMPLETE WITHOUT AN ERROR MESSAGE SIMILAR TO THE EXAMPLE SHOWN ABOVE?

NO Go to page 3-200-5.

YES





The first diagnostic menu should be on your display.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

- 0 – RUN DIAGNOSTIC ROUTINES
- 1 – FORMAT DISKETTE
- 2 – COPY DISKETTE
- 3 – PREPARE SYSTEM FOR RELOCATION
- 9 – EXIT TO SYSTEM DISKETTE

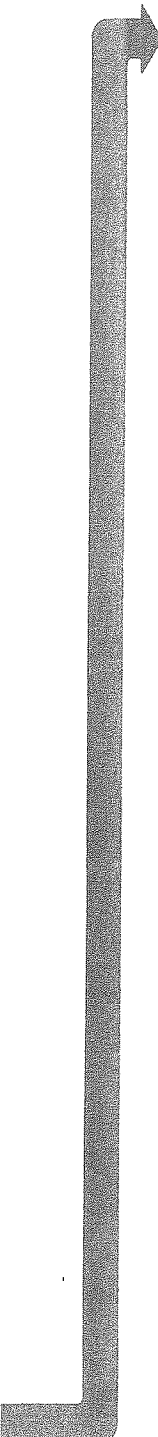
ENTER THE ACTION DESIRED

? 

**DID THE ABOVE MESSAGE APPEAR ON YOUR
SCREEN?**

NO Go to page 3-020-1, "Power!"

YES 

- 
1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
(Skip Step 2 if you have only one display adapter installed.)
 2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N)?).
 3. The installed devices list should be displayed. Check the amount of memory listed on your display (indicated by the arrow in the example below).
-

THE INSTALLED DEVICES ARE

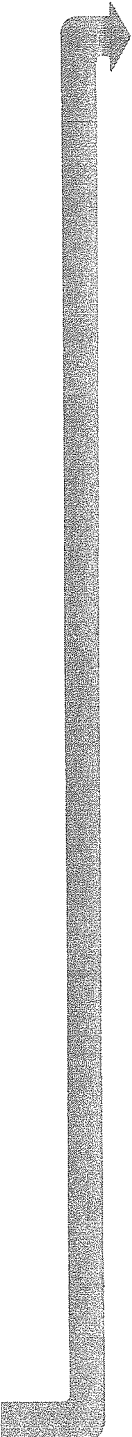
1 - S SYSTEM BOARD
18 - S EXPANSION OPTION
2 - S XXXKB MEMORY ←
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
6 - S X DISKETTE DRIVE(S) & ADAPTER
9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
17 - E X DISK DRIVE(S) & ADAPTER
14 - S MATRIX PRINTER

IS THIS LIST CORRECT (Y/N)? -  -


**DOES THE AMOUNT OF MEMORY LISTED MATCH
THE AMOUNT OF MEMORY IN YOUR SYSTEM?**

NO Go to page 3-200-23.

YES 

- 
1. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is incorrect, follow the instructions on the display to correct the list before answering yes.)
 2. Press 0 (RUN TEST ONE TIME) then press Enter.
 3. Press 2 (XXXXKB MEMORY) then press Enter.

You may receive an error message similar to the example below. If so, make a note of the four-character error code (indicated by the arrow below).

TESTING - XXXKB MEMORY
THIS TEST TAKES UP TO TWO MINUTES
PLEASE STAND BY
X:XX:XX
ERROR - XXXKB MEMORY 2XX S
FAILING ADDRESS - SPACE/MODULE XXXX ←
PRESS ENTER TO CONTINUE
? -  -

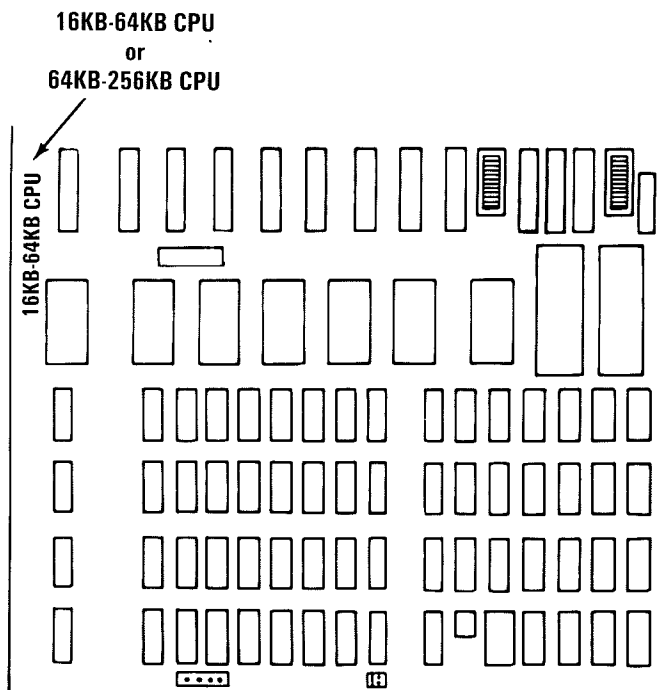
**DID YOU RECEIVE AN ERROR MESSAGE SIMILAR
TO THE EXAMPLE ABOVE?**

NO Go to page 3-200-25.

YES 

1. Refer to the figure below to determine if your system board uses 16K memory modules or 64K memory modules.

The system board is labeled either 16KB-64KB CPU or 64KB-256KB CPU.



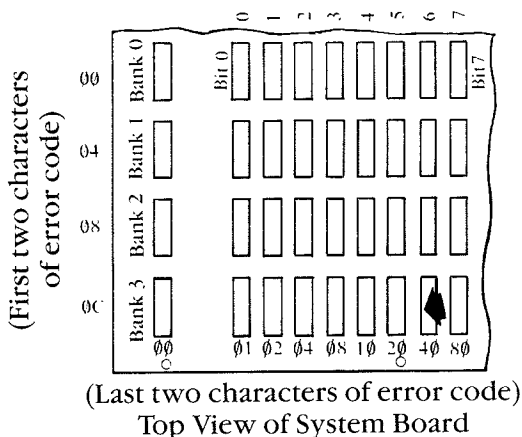
System Board
(Top View)

IS YOUR SYSTEM BOARD LABELED 16KB-64KB CPU?

NO Go to page 3-200-12.

YES

A memory failure displays the failing address in the form of a four-character alphanumeric code, followed by 201. If the first character of the four-character error code is 0, you have a system board failure. The second character 0, 4, 8, or C indicates which bank has the failing module. The third and fourth characters of the four-character error code indicate which bit (module) of the bank failed (P, 0, 1, 2, 3, 4, 5, 6, or 7). For example, error code 0C40 201 corresponds to the failing module indicated by the arrow, in bank 3, bit 6.



WAS THE FIRST CHARACTER OF THE FOUR-CHARACTER CODE SOMETHING OTHER THAN 0?

NO Replace the failing 16K module. See Section 5, "Removal/Replacement and Adjustments." If the last two characters of the error code do not match any of the module positions, replace the entire bank.

After replacing the module(s), go to page 3-200-1 and rerun the diagnostics. If you get the same error message again, make sure the new module(s) is installed correctly and is undamaged. If the problem remains, replace the system board.

YES


1. If your system does not have any 32KB memory expansion adapters, go to page 3-200-8.
2. Use the table below to find the first two characters of your error code and the corresponding switch settings.
3. Compare these switch settings with those of all the 32KB memory expansion adapters in your system. The failing option is the one with the switch settings that match those in the table.

First Two Characters of Error Code	32KB Expansion Option Switch Settings					
	1	2	3	4	5	6-8
10 or 14	ON	ON	ON	OFF	ON	N/A
18 or 1C	ON	ON	ON	OFF	OFF	N/A
20 or 24	ON	ON	OFF	ON	ON	N/A
28 or 2C	ON	ON	OFF	ON	OFF	N/A
30 or 34	ON	ON	OFF	OFF	ON	N/A
38 or 3C	ON	ON	OFF	OFF	OFF	N/A
40 or 44	ON	OFF	ON	ON	ON	N/A
48 or 4C	ON	OFF	ON	ON	OFF	N/A
50 or 54	ON	OFF	ON	OFF	ON	N/A
58 or 5C	ON	OFF	ON	OFF	OFF	N/A
60 or 64	ON	OFF	OFF	ON	ON	N/A
68 or 6C	ON	OFF	OFF	ON	OFF	N/A
70 or 74	ON	OFF	OFF	OFF	ON	N/A
78 or 7C	ON	OFF	OFF	OFF	OFF	N/A
80 or 84	OFF	ON	ON	ON	ON	N/A

WERE THE SWITCH SETTINGS IN YOUR MACHINE DIFFERENT FROM THE SWITCH SETTINGS IN THE CHART?

NO Replace the failing 32KB memory expansion adapter. See Section 5, "Removal/Replacement and Adjustments." After replacing the adapter, go to page 3-200-1 and rerun the diagnostics.

YES

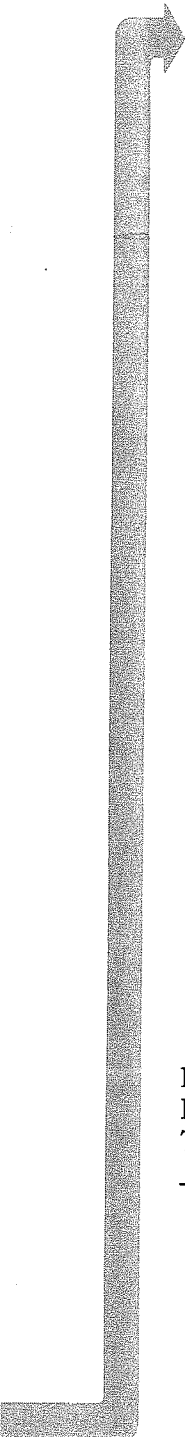
- 
1. If your system does not have any 64KB memory expansion adapters, go to page 3-200-9.
 2. Use the table below to find the first character of your error code and the corresponding switch settings.
 3. Compare these switch settings with those of all the 64KB memory expansion adapters in your system. The failing option is the one with the switch settings that match those in the table.
-

First Character of Error Code	64KB Expansion Option Switch Setting				
	1	2	3	4	5-8
1	ON	ON	ON	OFF	N/A
2	ON	ON	OFF	ON	N/A
3	ON	ON	OFF	OFF	N/A
4	ON	OFF	ON	ON	N/A
5	ON	OFF	ON	OFF	N/A
6	ON	OFF	OFF	ON	N/A
7	ON	OFF	OFF	OFF	N/A

WERE THE SWITCH SETTINGS IN YOUR MACHINE DIFFERENT FROM THE SWITCH SETTINGS IN THE TABLE?

NO Replace the failing 64KB memory expansion adapter. See Section 5, "Removal/Replacement and Adjustments." After replacing the memory expansion adapter, go to page 3-200-1 and rerun the diagnostics.

YES 

- 
1. Use the table below to find the first character of your error code and the corresponding switch settings.
 2. Compare these switch settings with those of all the 64/256 KB memory expansion adapters in your system. The failing option is the one with the switch settings that match those in the table.
-

First Character of Error Code	64/256KB Expansion Option Switch Settings				
	1	2	3	4	5-8
1,2,3, or 4	ON	ON	ON	OFF	N/A
5,6, or 7	ON	OFF	ON	OFF	N/A

**DOES YOUR SYSTEM HAVE A 64/256KB MEMORY
EXPANSION ADAPTER WITH SWITCH SETTINGS
THAT MATCH THOSE OF YOUR ERROR CODE?**

NO Go to Section 6, "Switch Settings," and compare your switch settings with the switch settings in the charts. Make the necessary corrections, then go to page 3-200-1 and rerun the diagnostics.

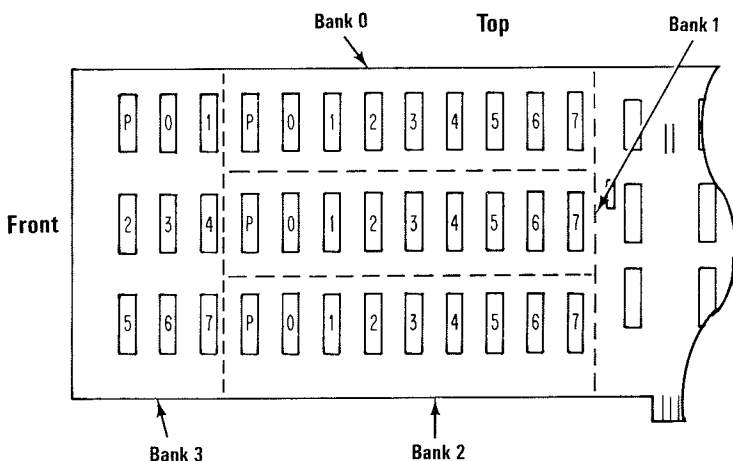
YES 

The failing 64/256KB memory expansion adapter is the one with the switch settings that match those for your error code.

When the third and fourth characters of the error code are 00,01,02,04,08,10,20,40 or 80, the failure is one of the pluggable 64K memory modules.

Third and Fourth

Characters of Error Code	00	01	02	04	08	10	20	40	80
Bit	P	0	1	2	3	4	5	6	7



ARE THE THIRD AND FOURTH CHARACTERS OF THE ERROR CODE 00,01,02,04,08,10,20,40, OR 80?

NO Replace the 64/256KB memory expansion option card. Remove all the 64K modules from the failing card and install them on the new card. See Section 5, "Removal/Replacement and Adjustments." After replacing the memory expansion adapter, go to page 3-200-1 and rerun the diagnostics.

YES

The first character of your error code identifies the bank that has the failing module. The third and fourth characters identify the failing bit (module). For example, error code 4008 201 corresponds to a failing module identified by the arrow in bank 3, bit (module) 3.

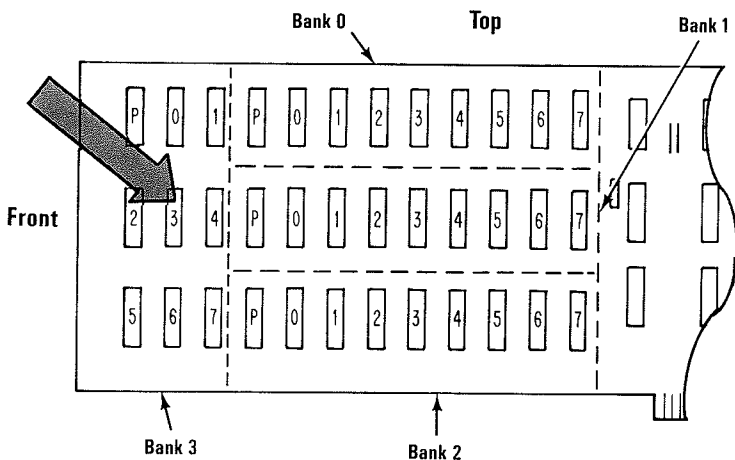
1. Replace the failing 64K module. See Section 5, "Removal/Replacement and Adjustments."

First Character of

Error Code	1 or 5	2 or 6	3 or 7	4
Bank	Bank 0	Bank 1	Bank 2	Bank 3

Third and Fourth

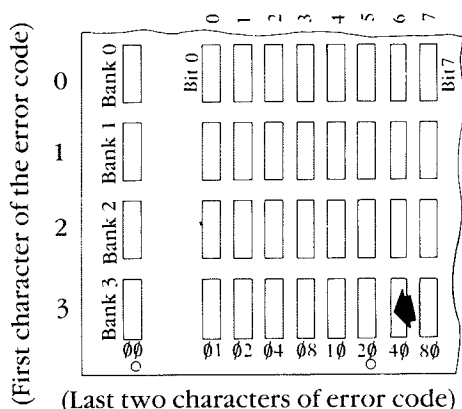
Characters of Error Code	00	01	02	04	08	10	20	40	80
Bit	P	0	1	2	3	4	5	6	7



Memory

Go to page 3-200-18.

A memory failure displays the failing address in the form of a four-character alphanumeric code, followed by 201. If the first character of the four-character error code is 0, 1, 2, or 3, you have a system board failure. The 0, 1, 2, or 3 indicates which bank has the failing module. The third and fourth characters of the four-character error code indicate which bit (module) of the bank failed (P,0,1,2,3,4,5,6, or 7). For example, error code 3040 201 corresponds to the failing module indicated by the arrow, in bank 3, bit 6.



Top View of System Board

WAS THE FIRST CHARACTER OF THE FOUR-CHARACTER CODE SOMETHING OTHER THAN 0, 1, 2, OR 3?

NO Replace the failing 64K module. See Section 5, "Removal/Replacement and Adjustments." If the last two characters of the error code do not match any of the module positions, replace the entire bank.

After replacing the module, go to page 3-200-1 and rerun the diagnostics. If you get the same error message again, make sure the new module(s) is installed correctly and is undamaged. If the problem remains, replace the system board.

YES




1. If your system does not have any 32KB memory expansion adapters, go to page 3-200-14.
2. Use the table below to find the first two characters of your error code and the corresponding switch settings.
3. Compare these switch settings with those of all the 32KB memory expansion adapters in your system. The failing option is the one with the switch settings that match those in the table.

First Two Characters of Error Code	32KB Expansion Option Switch Settings					
	1	2	3	4	5	6-8
40 or 44	ON	OFF	ON	ON	ON	N/A
48 or 4C	ON	OFF	ON	ON	OFF	N/A
50 or 54	ON	OFF	ON	OFF	ON	N/A
58 or 5C	ON	OFF	ON	OFF	OFF	N/A
60 or 64	ON	OFF	OFF	ON	ON	N/A
68 or 6C	ON	OFF	OFF	ON	OFF	N/A
70 or 74	ON	OFF	OFF	OFF	ON	N/A
78 or 7C	ON	OFF	OFF	OFF	OFF	N/A
80 or 84	OFF	ON	ON	ON	ON	N/A
88 or 8C	OFF	ON	ON	ON	OFF	N/A
90 or 94	OFF	ON	ON	OFF	ON	N/A

WERE THE SWITCH SETTINGS IN YOUR MACHINE DIFFERENT FROM THE SWITCH SETTINGS IN THE CHART?

NO Replace the failing 32KB memory expansion adapter. See Section 5, "Removal/Replacement and Adjustments." After replacing the adapter, go to page 3-200-1 and rerun the diagnostics.

YES

- 
1. If your system does not have any 64KB memory expansion adapters, go to page 3-200-15.
 2. Use the table below to find the first character of your error code and the corresponding switch settings.
 3. Compare these switch settings with those of all the 64KB memory expansion adapters in your system. The failing option is the one with the switch settings that match those in the table.
-

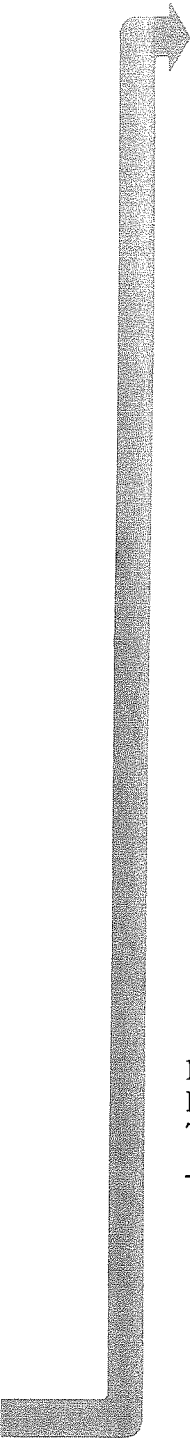
First Character of Error Code	64KB Expansion Option Switch Settings				
	1	2	3	4	5-8
4	ON	OFF	ON	ON	N/A
5	ON	OFF	ON	OFF	N/A
6	ON	OFF	OFF	ON	N/A
7	ON	OFF	OFF	OFF	N/A
8	OFF	ON	ON	ON	N/A
9	OFF	ON	ON	OFF	N/A

WERE THE SWITCH SETTINGS IN YOUR MACHINE DIFFERENT FROM THE SWITCH SETTINGS IN THE TABLE?

- NO** Replace the failing 64KB memory expansion adapter. See Section 5, "Removal/Replacement and Adjustments." After replacing the memory expansion adapter, go to page 3-200-1 and rerun the diagnostics.

YES



- 
1. Use the table below to find the first character of your error code and the corresponding switch settings.
 2. Compare these switch settings with those of all the 64/256 KB memory expansion adapters in your system. The failing option is the one with the switch settings that match those in the table.
-

First Character of Error Code	64/256KB Expansion Option Switch Settings				
	1	2	3	4	5-8
4, 5, 6, or 7	ON	OFF	ON	ON	N/A
8, or 9	OFF	ON	ON	ON	N/A

DOES YOUR SYSTEM HAVE A 64/256KB MEMORY EXPANSION ADAPTER WITH SWITCH SETTINGS THAT MATCH THOSE OF YOUR ERROR CODE?

NO Go to Section 6, "Switch Settings," and compare your switch settings with the switch settings in the charts. Make the necessary corrections, then go to page 3-200-1 and rerun the diagnostics.

YES

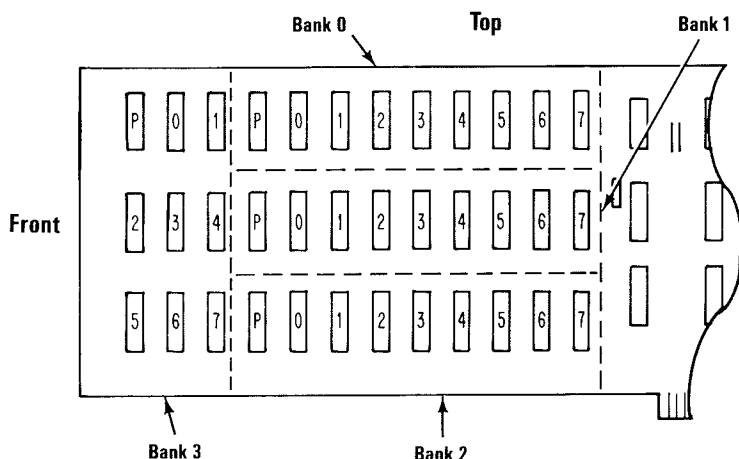


The failing 64/256KB memory expansion adapter is the one with the switch settings that match those for your error code.

When the third and fourth characters of the error code are 00,01,02,04,08,10,20,40 or 80, the failure is one of the pluggable 64K memory modules.

Third and Fourth

Characters of Error Code 00 01 02 04 08 10 20 40 80
 Bit P 0 1 2 3 4 5 6 7



ARE THE THIRD AND FOURTH CHARACTERS OF THE ERROR CODE 00,01,02,04,08,10,20,40 OR 80?

NO Replace the 64/256KB memory expansion option card. Remove all the 64K modules from the failing card and install them on the new card. See Section 5, "Removal/Replacement and Adjustments." After replacing the memory expansion adapter, go to page 3-200-1 and rerun the diagnostics.

YES

The first character of your error code identifies the bank that has the failing module. The third and fourth characters identify the failing bit (module). For example, error code 7008 201 corresponds to a failing module identified by the arrow in bank 3, bit (module) 3.

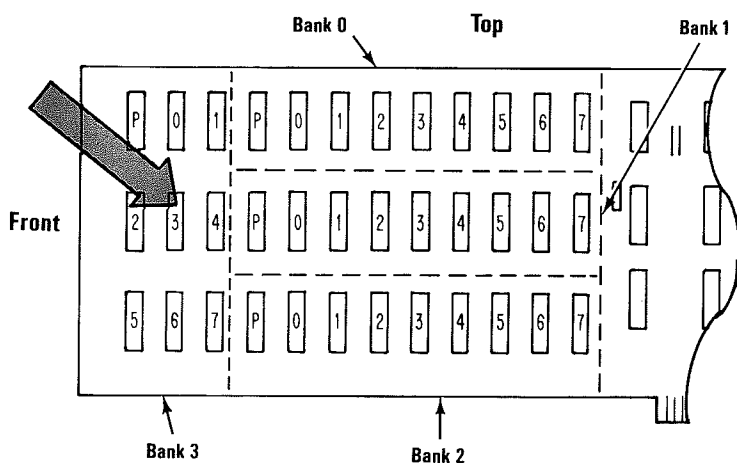
1. Replace the failing 64K module. See Section 5, "Removal/Replacement and Adjustments."

First Character of

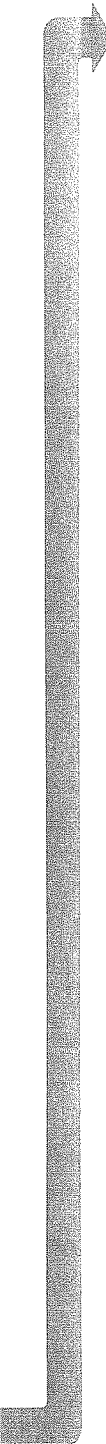
Error Code	4 or 8	5 or 9	6	7
Bank	Bank 0	Bank 1	Bank 2	Bank 3

Third and Fourth

Characters of Error Code	00	01	02	04	08	10	20	40	80
Bit	P	0	1	2	3	4	5	6	7



CONTINUE




Go to page 3-200-1 and rerun the diagnostics. After the diagnostics are complete, return to this page.

TESTING – XXXKB MEMORY

**DID YOU RECEIVE A MESSAGE OTHER THAN
200 S?**

NO Your system memory is functioning correctly.

YES 



Compare this error code with the note you made when you ran the diagnostic tests on page 3-200-4. Disregard the second character in both codes.

TESTING – XXXKB MEMORY
THIS TEST TAKES UP TO TWO MINUTES
PLEASE STAND BY
X:XX:XX
ERROR – XXXKB MEMORY 2XX S
FAILING ADDRESS – SPACE/MODULE XXXX

PRESS ENTER TO CONTINUE

**ARE THE FIRST, THIRD, AND FOURTH
CHARACTERS OF THE NEW ERROR CODE
IDENTICAL TO THOSE OF THE PREVIOUS
ERROR CODE?**

NO The memory has another failure. Make a note of the new error code. Go to page 3-200-5 and follow the PIC again.

YES



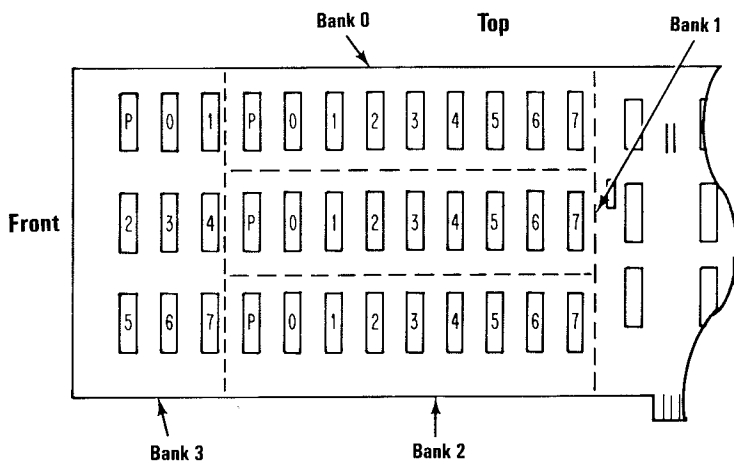
The same 64/256KB memory expansion adapter still has a failing module. With this type of failure, the first character is not correctly identifying the failing bank.

The third and fourth characters are still identifying the failing bit (module) correctly.

1. Replace the module in one of the banks that has not yet had a module replaced.
2. Go to page 3-200-1 and rerun the diagnostics. After the diagnostics are completed, return to this page and answer the question below.

Third and Fourth

Characters of Error Code 00 01 02 04 08 10 20 40 80
 Bit P 0 1 2 3 4 5 6 7



DID YOU RECEIVE A MESSAGE OTHER THAN 200 S?

NO Your system memory is now functioning correctly.

YES

Compare this error code with the note you made when you ran the diagnostic tests on page 3-200-4. Disregard the second character in both codes.

TESTING – XXXKB MEMORY
THIS TEST TAKES UP TO TWO MINUTES
PLEASE STAND BY
X:XX:XX
ERROR – XXXKB MEMORY 2XX S
FAILING ADDRESS – SPACE/MODULE XXXX

PRESS ENTER TO CONTINUE

**ARE THE FIRST THIRD, AND FOURTH
CHARACTERS OF THE NEW ERROR CODE
IDENTICAL TO THOSE OF THE PREVIOUS
ERROR CODE?**

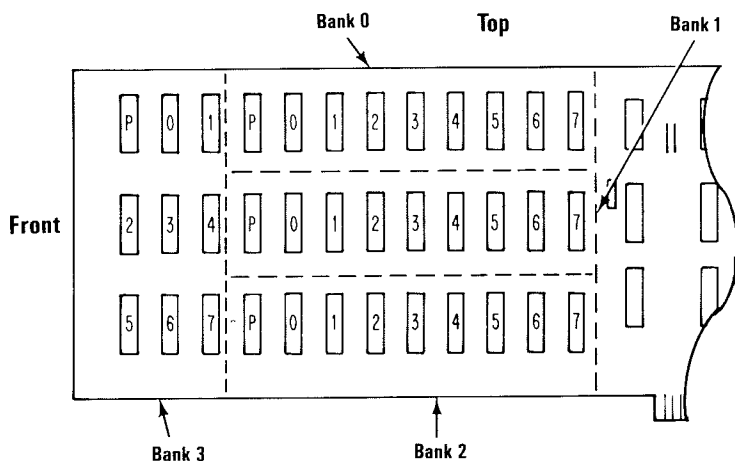
NO The memory has another failure. Make a note of the new error code. Go to page 3-200-5 and follow the PIC again.

YES 

The failing module may be in one of the other banks that has not yet had a module replaced.

Third and Fourth

Characters of Error Code	00	01	02	04	08	10	20	40	80
Bit	P	0	1	2	3	4	5	6	7



HAVE YOU REPLACED THE FAILING MODULE IN EACH OF THE FOUR BANKS?

NO Go to page 3-200-20.

YES Replace the 64/256KB memory expansion adapter. Remove all 64K modules from the failing adapter and install them on the new adapter. See Section 5, "Removal/Replacement and Adjustments." After replacing the memory expansion adapter, go to page 3-200-1 and rerun the diagnostics.

Go to Section 6, "Switch Settings," and compare your switch settings with those in the charts. Then return to this page.

THE INSTALLED DEVICES ARE


- 1 - S SYSTEM BOARD
- 2 - S XXXKB MEMORY
- 3 - S KEYBOARD
- 4 - S MONOCHROME & PRINTER ADAPTER
- 5 - S COLOR/GRAPHICS ADAPTER
- 6 - S X DISKETTE DRIVE(S) & ADAPTER
- 14 - S MATRIX PRINTER

IS THIS LIST CORRECT (Y/N)? 

**WERE THE SWITCH SETTINGS CORRECT FOR
THE AMOUNT OF MEMORY INSTALLED IN YOUR
SYSTEM?**

NO Correct the switch settings, then go to page
3-200-1 and rerun the diagnostics.


YES 

- 
1. Press N then press Enter.
The amount of memory on your display does not match the amount of memory installed in your system, but the switches are set correctly.
 2. Follow the instructions on the display to correct the amount of memory shown on the installed devices list.
-

THE INSTALLED DEVICES ARE

1 - S SYSTEM BOARD
2 - S XXXKB MEMORY
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
5 - S COLOR/GRAPHICS ADAPTER
6 - S X X DISKETTE DRIVE(S) & ADAPTER
14 - S MATRIX PRINTER

IS THIS LIST CORRECT (Y/N)?
X:XX:XX
ERROR - SYSTEM BOARD 199 S

ENTER (A) TO ADD ITEMS
OR ENTER (D) TO DELETE ITEMS
? -  -

**DOES THE AMOUNT OF MEMORY LISTED ON
YOUR DISPLAY MATCH THE AMOUNT OF
MEMORY IN YOUR SYSTEM?**

NO You have entered the wrong amount of memory.
Follow the instructions on the display again and
correct the amount of memory shown on the
installed devices list.

YES Go to page 3-200-4.

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

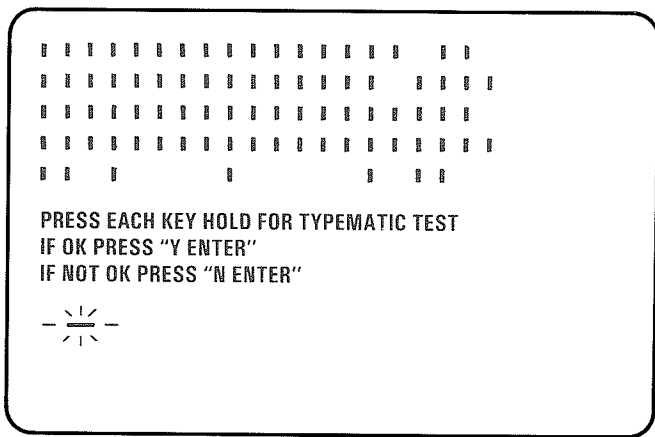
Notes:

Keyboard

If you have visibly broken parts, see Section 5, "Removal/Replacement and Adjustments."

1. Insert your Advanced Diagnostics diskette and proceed with running diagnostic routines.
2. Select the keyboard test 3 and perform the test displayed on the screen.
3. If any key does not function properly, press N and Enter.

If you have a 3XX error code or a non-functioning keyboard, before performing the keyboard test, go to page 3-300-2.



**AFTER PERFORMING THE TEST ON THE SCREEN,
DID YOU HAVE A 3XX ERROR CODE?**

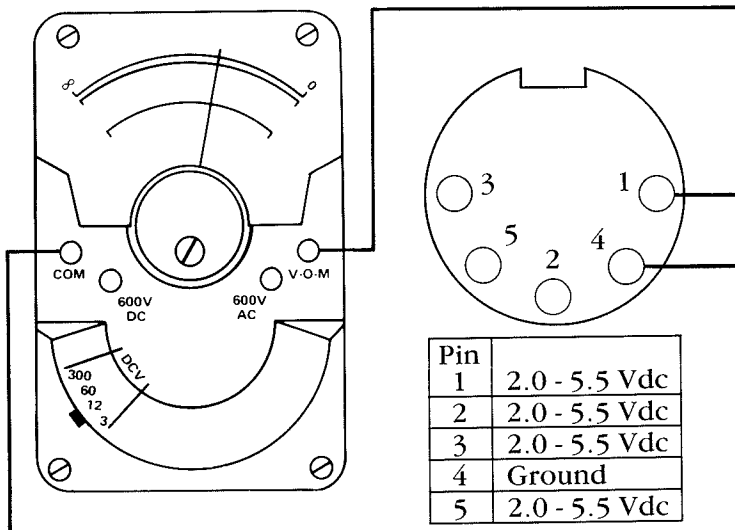
NO Go to page 3-300-3.

YES



1. Set the Power switch on the system unit, (and expansion unit, if attached) to Off.
2. Remove the keyboard connector from the system unit.
3. Set the expansion unit (if attached) and system unit power switches to On.
4. Check the keyboard connector at the system unit for the appropriate voltages, as shown in the diagram.

(Rear View of System Unit)



ARE ALL THE VOLTAGES CORRECT?

NO Replace the system board. See Section 5, "Removal/Replacement and Adjustments."

YES Check the keyboard cable connectors for damage, then replace keyboard assembly. See Section 5, "Removal/Replacement and Adjustments."

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unresolved problem, you should seek technical assistance.

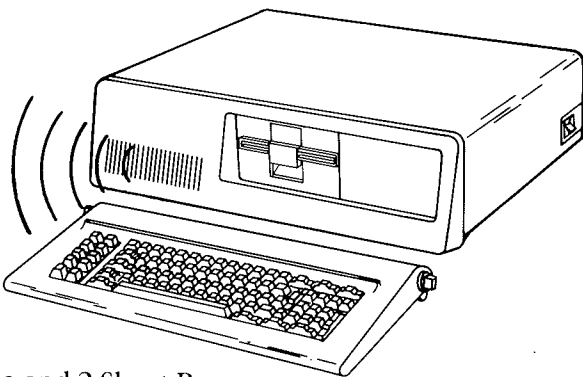
Notes:

Display (Monochrome)

You have entered this PIC because you were unable to complete POST, you have visually detected a display problem, or you have an error message indicating a display problem.

If you have determined that you have a color display problem, or you only have a color display, go to color display PICs on page 3-500-1.

1. Set the Power switch on the system unit, (and the expansion unit, if attached) to Off.
2. Remove the Monochrome Display connector from the system unit.
3. Insert your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit (if attached) and the system unit to On.
5. Note any audio messages during POST.



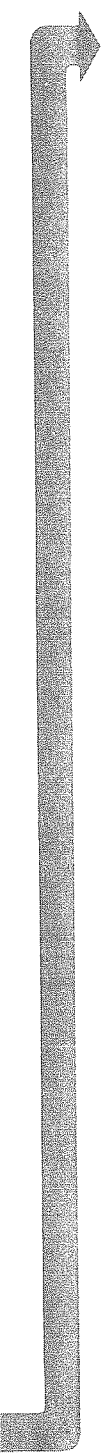
1 Long and 2 Short Beeps

IS YOUR ERROR INDICATION SOMETHING OTHER THAN ONE LONG AND TWO SHORT BEEPS?

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES



- 
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Reconnect the display.
 3. Set the Power switch on the expansion unit, (if attached) and system unit to On.
 4. Be sure your brightness and contrast controls are turned fully clockwise.
-

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? 

**IS THE ABOVE MESSAGE STABLE AND READABLE
ON YOUR DISPLAY?**

NO Go to page 3-400-14

YES 

→ Your display may function properly except for a cursor which is out of its normal position or missing.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
 - 1 - FORMAT DISKETTE
 - 2 - COPY DISKETTE
 - 3 - PREPARE SYSTEM FOR RELOCATION
 - 9 - EXIT TO SYSTEM DISKETTE
- ENTER THE ACTION DESIRED

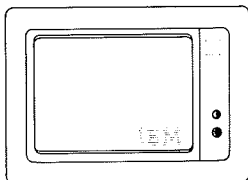
? -  -

**IS THE CURSOR VISIBLE AND IS IT IN THE
CORRECT POSITION ON YOUR DISPLAY?**

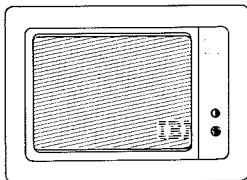
NO Replace your IBM Monochrome Display and
Printer Adapter. See Section 5, "Removal/
Replacement and Adjustments."

YES →

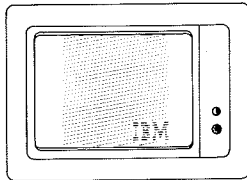
→ Your display may be distorted or the characters may be the wrong size, as shown in the examples:



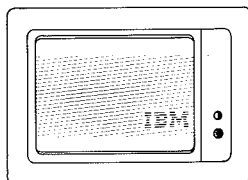
Too Dim



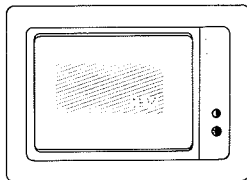
Too Wide



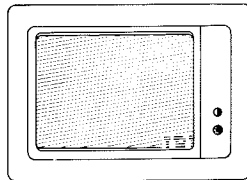
Too Narrow



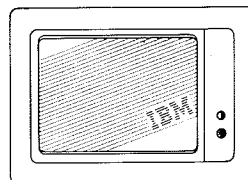
Too Short



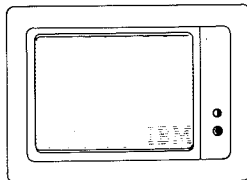
Shrunk



**Changes Size When
Brightness Control
Turned**



Tilted



Out of Focus

**IS YOUR SYMPTOM SOMETHING OTHER THAN A
DISPLAY SIMILAR TO ONE OF THE EXAMPLES?**

NO Replace your display. See Section 5, "Removal/
Replacement and Adjustments."

YES →

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you only have one display adapter installed)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter (If the list is incorrect, follow the instructions on the display to correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Press 4 (MONOCHROME & PRINTER ADAPTER) then press Enter.
6. Select 10 (RUN ALL TESTS) then press Enter.

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.

THIS LINE IS INTENSIFIED.

THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING.

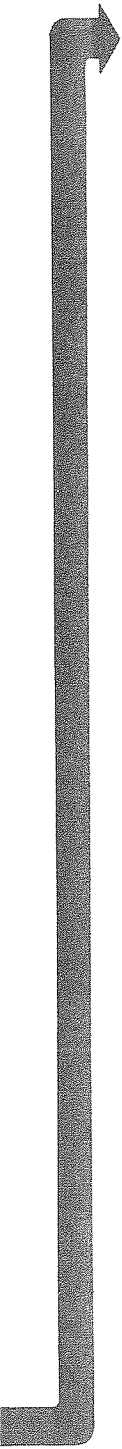
THIS LINE IS UNDERLINED.

IS THE SCREEN CORRECT? (Y/N) - ☼ -

IS THE ABOVE SCREEN DISPLAYED WITHOUT A 401 ERROR MESSAGE?

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES



Adjust your brightness and contrast controls until the intensified line is brighter than the other lines.

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.

THIS LINE IS INTENSIFIED.

THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING.

THIS LINE IS UNDERLINED.

IS THE SCREEN CORRECT? (Y/N) 

**WERE YOU ABLE TO ADJUST FOR AN
INTENSIFIED LINE?**

NO Go to page 3-400-14.

YES 

Each line on your display should match the description of that line.

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.

THIS LINE IS INTENSIFIED.

THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING.

THIS LINE IS UNDERLINED.

IS THE SCREEN CORRECT? (Y/N) 

DO THE LINES ON YOUR DISPLAY MATCH THEIR DESCRIPTIONS?

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES 

1. Press Y then press Enter.
2. Each character on your display should match the character shown on the screen below.

CHARACTER SET

. , @ ♥ ♦ ◆ ♦ ♦ ■ ■ ■ / : ; [\] ^ _ ` { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿
 " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢
 £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢
 £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿



IS THE SCREEN CORRECT? (Y/N) — ☼ —

**DO THE CHARACTERS ON YOUR DISPLAY
MATCH THE CHARACTERS ON THE SCREEN?**

NO Replace your IBM Monochrome Display and
Printer Adapter. See Section 5, "Removal/
Replacement and Adjustments."

YES

1. Press Y then press Enter.
2. Each character on your display should match the character shown on the screen below.

80X25 DISPLAY

[illegible]

IS THE SCREEN CORRECT? (Y/N) Y

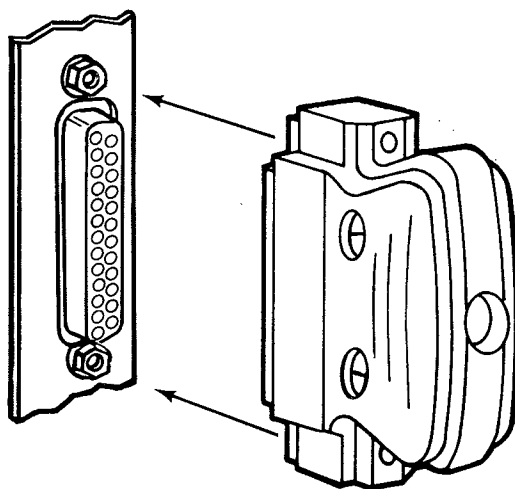
DO THE CHARACTERS ON YOUR DISPLAY MATCH THE CHARACTERS ON THE SCREEN?

- NO** Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

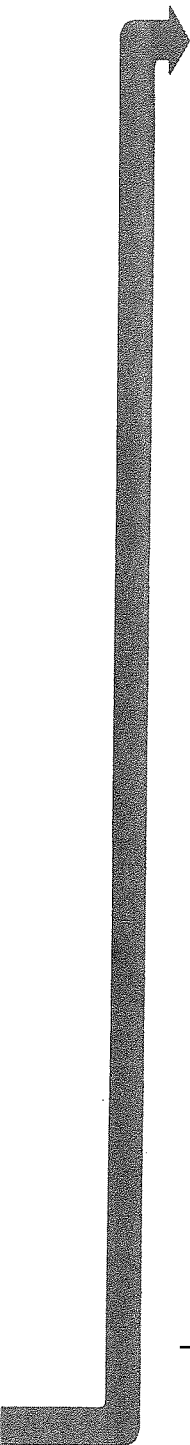
1. Disconnect the printer cable.
 2. Install the printer adapter wrap plug as shown in the diagram below. If you run the test without installing the wrap plug, you will receive an invalid error message.
-

IBM Monochrome Display and Printer Adapter



**Printer
Adapter Wrap Plug
(IBM Part 8529228)**


CONTINUE

- 
1. Press Y then press Enter.
 2. The wrap plug should be installed.
-

PRINTER ADAPTER TEST


INSERT WRAP PLUG AND PRESS "ENTER"? 

CONTINUE 

- 
1. Press Enter to begin the wrap test.
 2. An error message similar to the one shown below may appear on your screen.
-

0:01:00

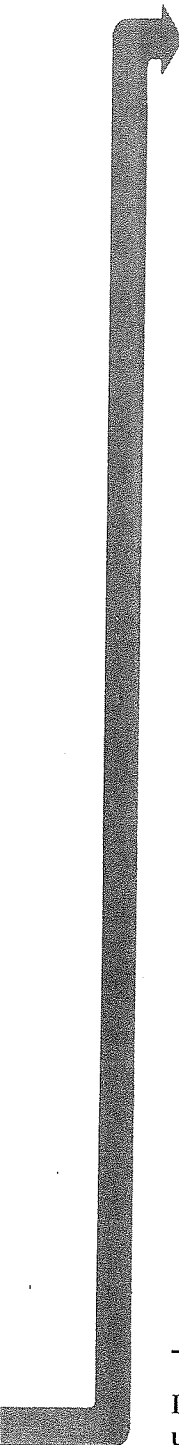
ERROR – MONOCHROME & PRINTER ADAPTER TEST 432S
4 – PRINTER ADAPTER TEST

PRESS ENTER TO CONTINUE –  –

**DID YOU COMPLETE THE TEST WITHOUT AN
ERROR MESSAGE?**

NO Replace your IBM Monochrome Display and
Printer Adapter. See Section 5, “Removal/
Replacement and Adjustments.”

YES 



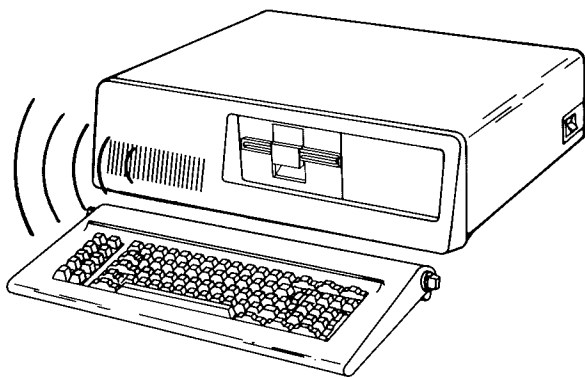
You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unresolved problem, you should seek technical assistance.

You will use audio responses to guide yourself through the diagnostics.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Insert your Advanced Diagnostics diskette in drive A.
 3. Set the Power switch on the expansion unit (if attached) and system unit to On.
-



CONTINUE



Press the following keys in the sequence listed and listen for the "BEEP" each time you press Enter.

Note: Use the numbers on the top row of the keyboard; do not use the numeric keypad.

Steps	Test Selection	Audio Response
1. Press 0	Run diagnostics	None
2. Press Enter		1 Beep
Note: If you do not have a color adapter installed, skip steps 3 & 4.		
3. Press Y or N	Is a monitor attached to every display adapter?	None
4. Press Enter		1 Beep
5. Press Y	Are the options correct?	None
6. Press Enter		1 Beep
7. Press 0	Run test one time	None
8. Press Enter		1 Beep
9. Press 4	Select monochrome display & printer adapter test	None
10. Press Enter		2 Beeps


WERE YOU ABLE TO COMPLETE THE AUDIO RESPONSE DIAGNOSTICS BY PRESSING THE ABOVE SEQUENCE OF KEYS?

NO You may have a power supply or connector problem. Check your connectors or go to PIC 3-020-1, "Power."

YES

Your display should match the screen below.

**TESTING – MONOCHROME & PRINTER ADAPTER
IBM MONOCHROME DISPLAY AND
PRINTER ADAPTER TEST**

- 0 – DISPLAY ADAPTER TEST
- 1 – DISPLAY ATTRIBUTES
- 2 – CHARACTER SET
- 3 – 80X25 DISPLAY
- 4 – PRINTER ADAPTER TEST
- 9 – EXIT TO MAIN MENU
- 10 – RUN ALL ABOVE TESTS
- 11 – VIDEO TEST
- 12 – SYNC TEST
- ? – 

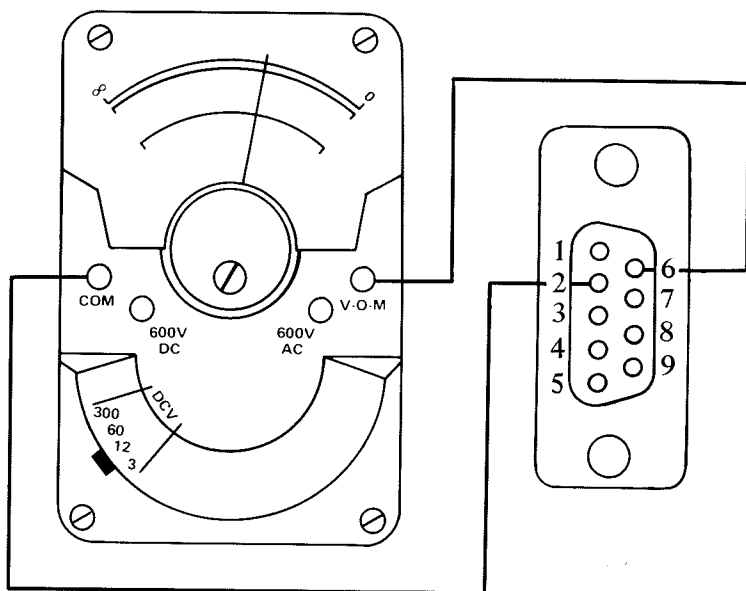
**ARE ALL CHARACTERS ON YOUR SCREEN
CORRECT AND READABLE?**

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, “Removal/Replacement and Adjustments.”

Note: If your display is completely blank or is in complete reverse video, continue on the next page.

YES

1. Select 11, then press Enter. Selecting this test should place a test signal on pins 6 and 7 of the nine pin connector.
2. Remove the display signal cable.
3. Measure the voltage present between pins 2 and 7. The voltage should read between 2.4 Vdc and 3.8 Vdc.
4. Measure the voltage present between pins 2 and 6. The voltage should read between 2.4 Vdc and 3.8 Vdc.

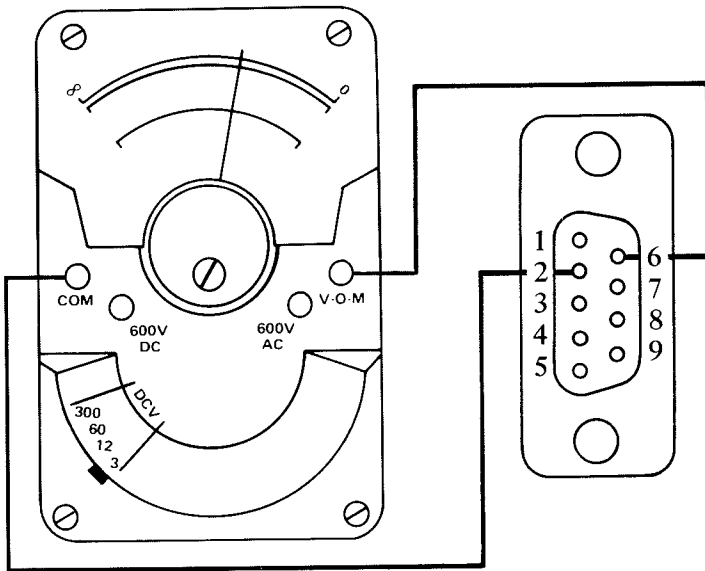


ARE THE VOLTAGE READINGS CORRECT?

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Press Enter. Selecting this test changes the test signal on pins 6 and 7 of the nine pin connector.
 2. Measure the voltage present between pins 2 and 7. The voltage should read between 0 Vdc and 0.5 Vdc.
 3. Measure the voltage present between pins 2 and 6. The voltage should read between 0 Vdc and 0.5 Vdc.
-



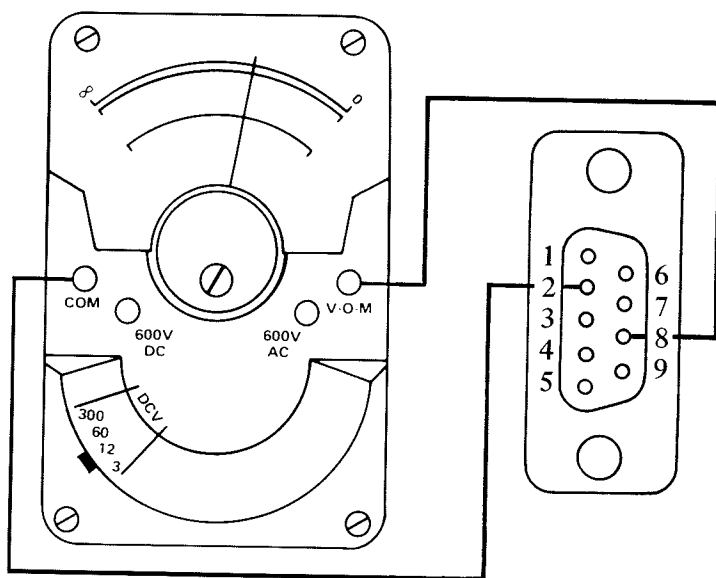
ARE THE VOLTAGE READINGS CORRECT?

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Press Enter, and wait for two "BEEPS." Selecting this test places a test signal on pins 8 and 9 of the nine pin connector.
2. Measure the voltage present between pins 2 and 8. The voltage should read between 0.4 Vdc and 1.1 Vdc.
3. Measure the voltage present between pins 2 and 9. The voltage should read between 3.0 Vdc and 4.2 Vdc.

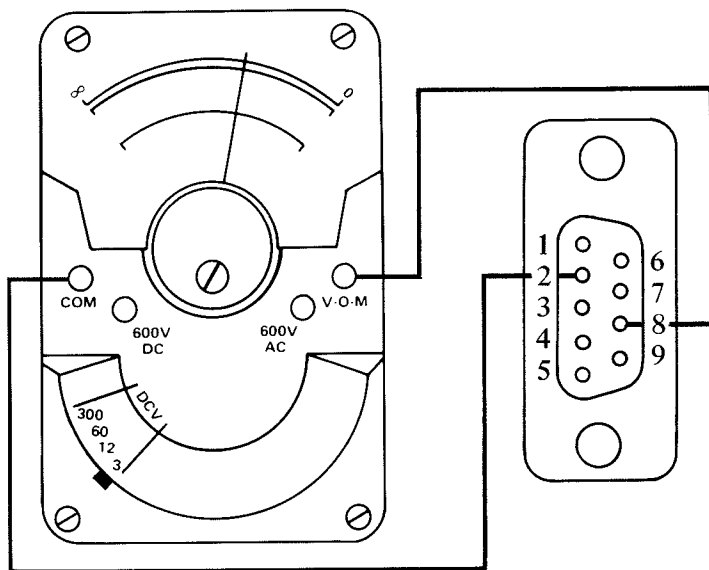


ARE THE VOLTAGE READINGS CORRECT?

NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Select 12 then press Enter. Selecting this test changes the test signal on pins 8 and 9 of the nine pin connector.
 2. Measure the voltage present between pins 2 and 8. The voltage should read between 1.5 Vdc and 2.5 Vdc.
 3. Measure the voltage present between pins 2 and 9. The voltage should read between 1.8 Vdc and 2.6 Vdc.
-



ARE THE VOLTAGE READINGS CORRECT?

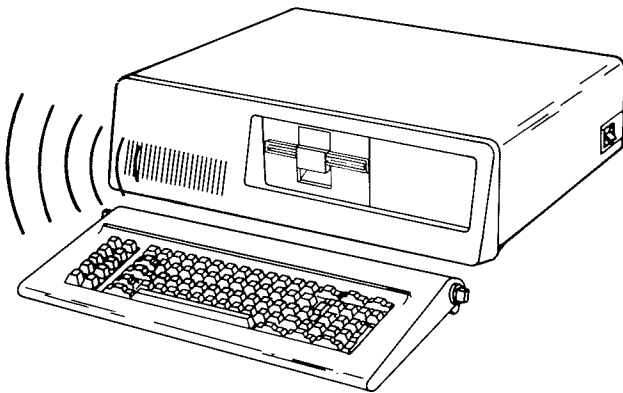
NO Replace your IBM Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES Replace your display. See Section 5, "Removal/Replacement and Adjustments."

Display (Color/Graphics)

You have entered this PIC because you were unable to complete POST, you visually detected a color/graphics problem, or you have an error message indicating a color/graphics problem.

1. Set the Power switch on the system unit (and the expansion unit, if attached) to Off.
2. Insert your Advanced Diagnostics diskette.
3. Set the Power switch on the expansion unit, (if attached) and the system unit to On.
4. If your display has a separate power switch, set it to On.
5. Turn your brightness and contrast controls fully clockwise.
6. Note any audio responses during POST.



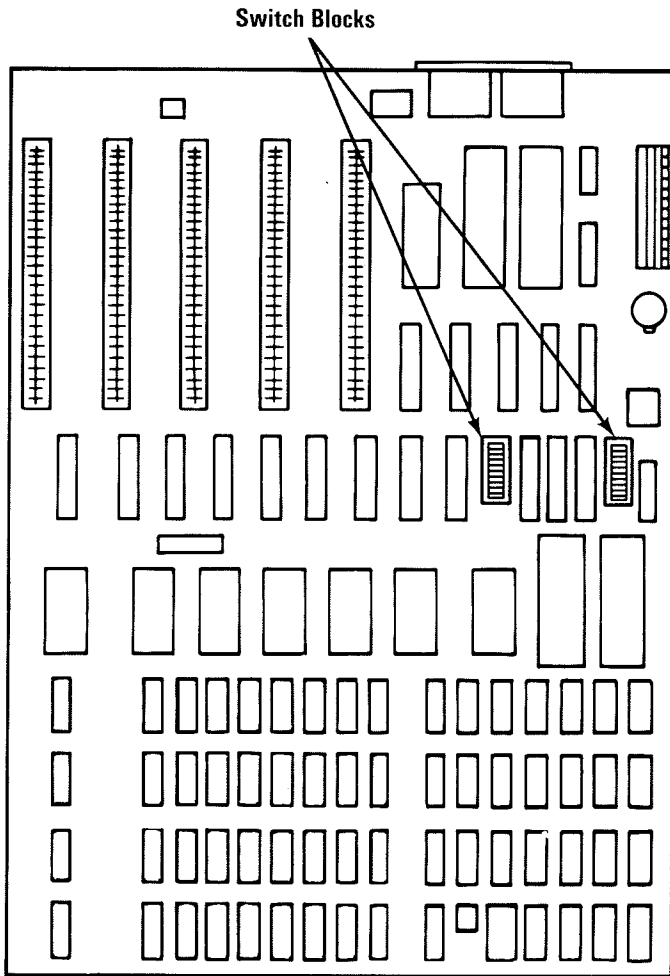

1 Long and 2 Short Beeps

IS YOUR ERROR INDICATION ONE LONG AND TWO SHORT BEEPS?

NO Go to page 3-500-4.

YES



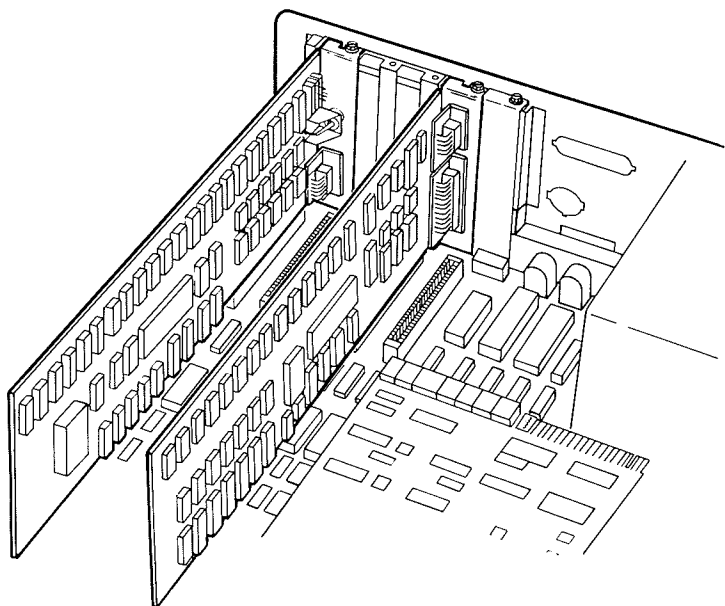


ARE THE SWITCHES IN YOUR MACHINE SET CORRECTLY?

NO Correct the switch settings and verify that the system is operating correctly.

YES 

Examine your system to determine how many display adapters are installed.



Display (Color Graphics)

DO YOU HAVE TWO DISPLAY ADAPTERS INSTALLED?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

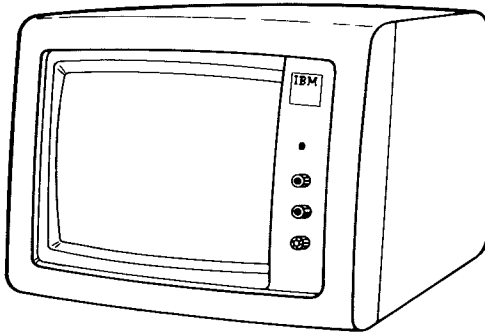
YES Replace the Monochrome Display and Printer Adapter. See Section 5, "Removal/Replacement and Adjustments."

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you have only one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
 3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter (If the list is incorrect, follow the instructions on the display to correct the list before answering yes).
 4. Press 0 (RUN TESTS ONE TIME) then press Enter.
 5. Press 5 (COLOR/GRAPHICS MONITOR ADAPTER) then press Enter.
 6. Select 10 (RUN ALL TESTS) then press Enter.
-



IS THE SCREEN DARK (NO ILLUMINATION)?

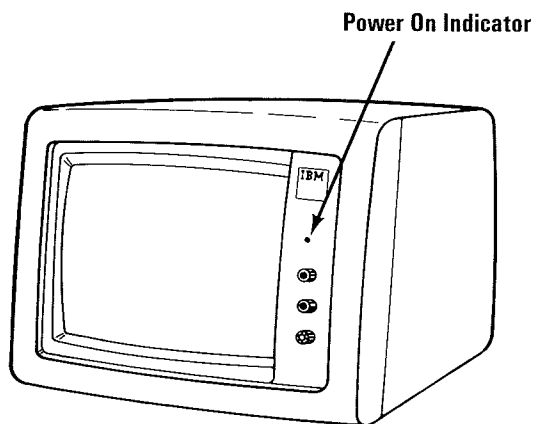
NO Go to page 3-500-8.

YES



If you do not have an IBM Color Display, continue on page 3-500-25.

Check the power on indicator on your IBM Color Display.




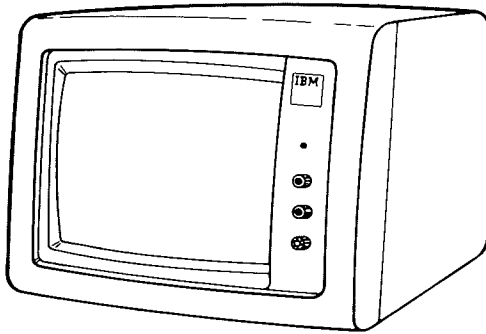
Display (Color Graphics)

IS THE POWER ON INDICATOR LIGHTED?

NO Go to page 3-500-7.

YES 

- 
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Set the Power switch on the display to Off.
 3. Disconnect the IBM Color Display signal cable from the back of the color/graphics adapter.
 4. Set the Power switch on the display to On.
-



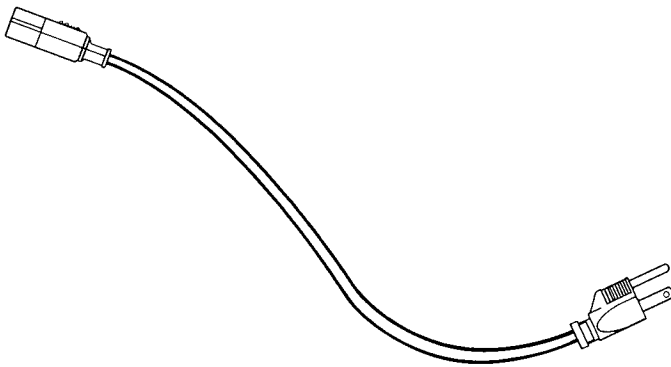
IS THE SCREEN STILL DARK (NO ILLUMINATION)?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the IBM Color Display. See Section 5, "Removal/Replacement and Adjustments."

The power cord may not be supplying power to your display.

Check continuity on the display power cord.




DID THE POWER CORD CHECK OUT GOOD?

NO Replace the power cord.

YES Replace the IBM Color Display. See Section 5, "Removal/Replacement and Adjustments."

Diagnostics should have successfully loaded and the screen shown below should be displayed.

COLOR/GRAPHICS MONITOR ADAPTER TEST

0 - DISPLAY ADAPTER TEST
1 - DISPLAY ATTRIBUTES
2 - CHARACTER SET
3 - 80X25 DISPLAY
4 - 40X25 DISPLAY
5 - 320X200 GRAPHICS
6 - 640X200 GRAPHICS
7 - LIGHT PEN TEST
8 - SCREEN PAGING
9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
11 - VIDEO TEST
12 - SYNC TEST
ENTER NUMBER OF DESIRED ACTION 

**IS THE ABOVE SCREEN STABLE AND READABLE
ON YOUR DISPLAY?**

NO If you do not have an IBM Color Display, go to page 3-500-25.

If you have an IBM Color Display, go to Section 5, "Removal/Replacement and Adjustments," and perform the vertical hold adjustment. Then begin this page again. If you have already attempted this adjustment, and still do not have a stable and readable screen, go to page 3-500-25.


YES



→ Your display may function correctly except that the cursor is out of its normal position or is missing.

COLOR/GRAPHICS MONITOR ADAPTER TEST

- 0 - DISPLAY ADAPTER TEST
- 1 - DISPLAY ATTRIBUTES
- 2 - CHARACTER SET
- 3 - 80X25 DISPLAY
- 4 - 40X25 DISPLAY
- 5 - 320X200 GRAPHICS
- 6 - 640X200 GRAPHICS
- 7 - LIGHT PEN TEST
- 8 - SCREEN PAGING
- 9 - EXIT TO MAIN MENU
- 10 - RUN ALL ABOVE TESTS
- 11 - VIDEO TEST
- 12 - SYNC TEST

ENTER NUMBER OF DESIRED ACTION - 

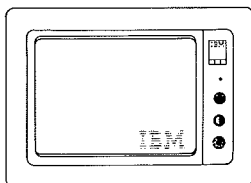
IS THE CURSOR VISIBLE AND CORRECTLY POSITIONED ON YOUR DISPLAY?

NO Replace your Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

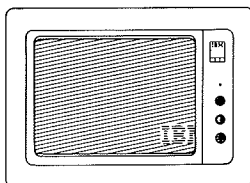
YES →

Your display may be distorted or the characters may be the wrong size, as shown in the examples below.

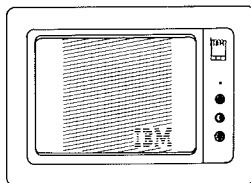
If the characters are the wrong size, go to Section 5, "Removal/Replacement and Adjustments" and perform the vertical size adjustment. Then answer the question below.



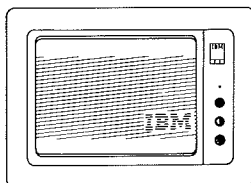
Too Dim



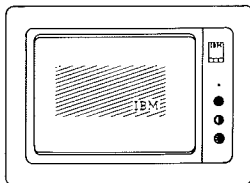
Too Wide



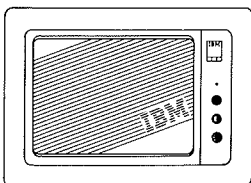
Too Narrow



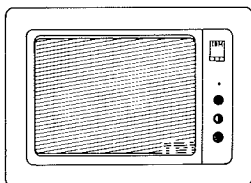
Too Short



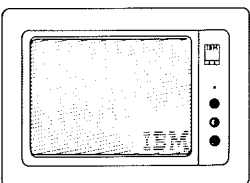
Shrunk



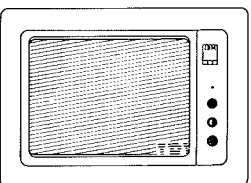
Tilted



**Changes Size When
Brightness Control
Turned**



Out of Focus



**Characters Shifted Left
or Right, or Up or Down,
Off the Display Area**

**IS YOUR SYMPTOM DIFFERENT FROM THE
EXAMPLES SHOWN?**

NO Replace your display. See Section 5, "Removal/
Replacement and Adjustments."

YES

➔ Select 10 then press Enter.

The Color/Graphics Monitor Adapter tests should run without a 501 error code being displayed.

DISPLAY ATTRIBUTES
THIS LINE IS AT NORMAL INTENSITY.
THIS LINE IS INTENSIFIED.
THIS LINE IS IN REVERSE VIDEO.
THIS LINE IS BLINKING.
■ BLUE
■ GREEN
■ CYAN
■ RED
■ MAGENTA
■ YELLOW
□ WHITE
IS THE SCREEN CORRECT? (Y/N) ☼

DID THE TESTS RUN WITHOUT A 501 ERROR CODE?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES ➔

If you have an IBM Color Display or other direct drive color monitor, go to the next page.

Composite color displays may be limited to two color shades, the darker shade on top.

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.

THIS LINE IS INTENSIFIED.

THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING.


 BLUE

 GREEN

 CYAN

 RED

 MAGENTA

 YELLOW

 WHITE

IS THE SCREEN CORRECT? (Y/N) 

**ARE ALL THE COLORS PRESENT AND OF
CORRECT HUE ON THE DISPLAY?**







NO If you have a composite monitor, go to Section 5, "Removal/Replacement and Adjustments," and perform the color trimmer capacitor adjustment. Then return to this page. If you have already performed this adjustment, then go to page 3-500-25.


YES 

Direct drive displays may not support the intensified line. If you do not have an IBM Color Display, continue on the next page.

Adjust the brightness and contrast controls until the intensified line is brighter than the other lines.

DISPLAY ATTRIBUTES
THIS LINE IS AT NORMAL INTENSITY.
THIS LINE IS INTENSIFIED.
THIS LINE IS IN REVERSE VIDEO.
THIS LINE IS BLINKING.

 BLUE
 GREEN
 CYAN
 RED
 MAGENTA
YELLOW
 WHITE

IS THE SCREEN CORRECT? (Y/N) 








**WERE YOU ABLE TO ADJUST FOR AN
INTENSIFIED LINE?**

NO Go to page 3-500-25.

YES 

On composite monitors, the colors will appear in two shades with the darker shade on top. Direct drive monitors may not support the intensified line.

The appearance of each line on your display should match the description on that same line.

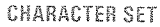
DISPLAY ATTRIBUTES
THIS LINE IS AT NORMAL INTENSITY.
THIS LINE IS INTENSIFIED.
THIS LINE IS IN REVERSE VIDEO.
THIS LINE IS BLINKING.
 BLUE
 GREEN
 CYAN
 RED
 MAGENTA
YELLOW
 WHITE
IS THE SCREEN CORRECT? (Y/N) 

DO ALL THE LINES MATCH THEIR DESCRIPTIONS?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES 

Display (Color Graphics)

[illegible]

IS THE SCREEN CORRECT? (Y/N) Y

NO Replace the Color/Graphics Monitor Adapter. See Section 5, “Removal/Replacement and Adjustments.”

3-500-15

Press Y, then press Enter. The screen shown below should appear on your display. The border should be black.

80X25 DISPLAY

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`a
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abc
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcde
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdef
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefg
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefgh
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghi
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
OPQRSTUVWXYZ[\]^_`abcdefghijk
```

IS THE SCREEN CORRECT? (Y/N) 

IS THE BORDER BLACK AND ARE THE CHARACTERS PRESENT AND COMPLETE?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES 

Press Y, then press Enter. The screen shown below should appear on your display. The border should be white.

40X25 DISPLAY

```
!"#$%&'()*+,-./0123456789:;<=>?  
!"#$%&'()*+,-./0123456789:;<=>?@  
!"#$%&'()*+,-./0123456789:;<=>?@A  
!"#$%&'()*+,-./0123456789:;<=>?@AB  
!"#$%&'()*+,-./0123456789:;<=>?@ABC  
!"#$%&'()*+,-./0123456789:;<=>?@ABCD  
!"#$%&'()*+,-./0123456789:;<=>?@ABCDE  
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEF  
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG  
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
```

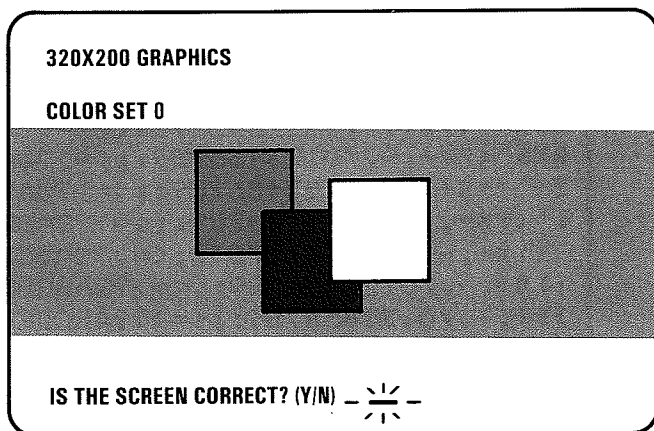
IS THE SCREEN CORRECT? (Y/N) - ✱ -

IS THE BORDER WHITE AND ARE THE CHARACTERS PRESENT AND COMPLETE?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

Press Y, then press Enter. The screen shown below should appear on your display. The background should be dark cyan. From left-to-right, the boxes should be intensified green, intensified red and intensified yellow. The characters are printed in intensified yellow.



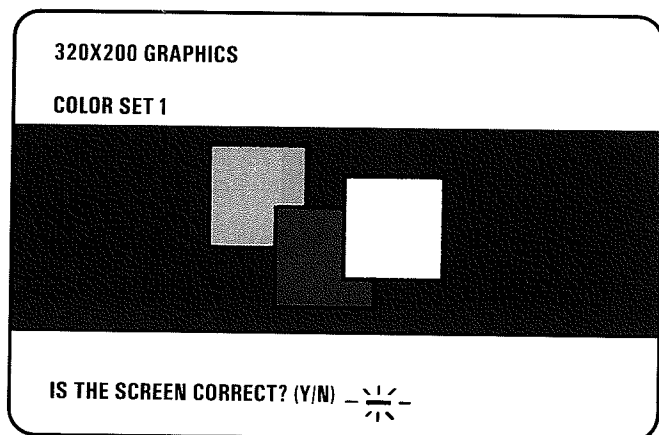
IS THE GRAPHIC DISPLAY THE SAME AS YOU SEE HERE?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES



Press Y, then press Enter. The screen shown below should appear on your display. The background should be intensified red. From left-to-right, the boxes should be dark cyan, dark magenta and non-intensified white (light gray). The characters are printed in dark magenta.

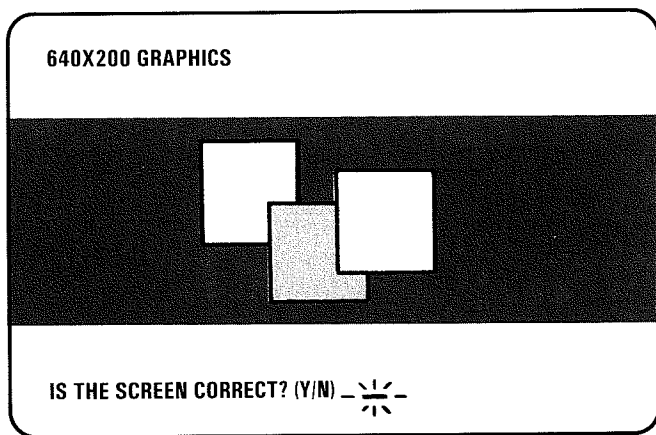


IS THE GRAPHIC DISPLAY THE SAME AS YOU SEE HERE?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

Press Y, then press Enter. The screen shown below should appear on your display. The background should be black. From left-to-right, the boxes should be gray, gray and white. The characters are printed in white.



IS THE GRAPHIC DISPLAY THE SAME AS YOU SEE HERE?


NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES



Press Y, then press Enter. The screen shown below should appear on your display.

LIGHT PEN TEST

SKIP LIGHT PEN TEST? 

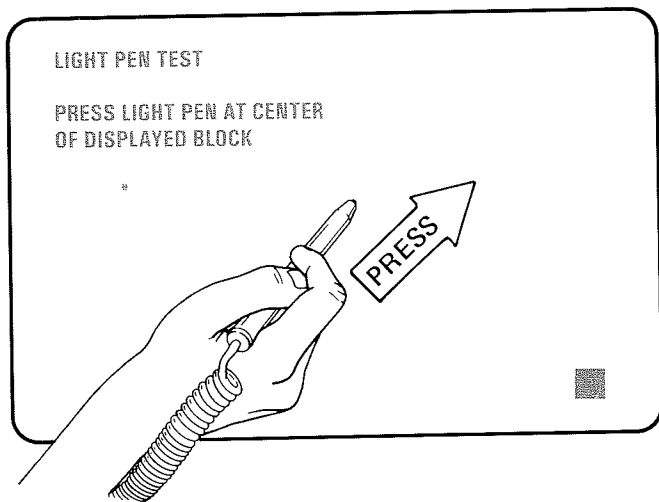
DO YOU HAVE A LIGHT PEN INSTALLED?

NO Go to page 3-500-23.

YES 

This is a timed test. If you wait longer than 60 seconds to respond or if you are not careful where you place the top of the pen before you push it, you may receive an error message.

1. Position the tip of the light pen in the center of the block and press the pen toward the display as shown below. The displayed block will be replaced by an asterisk(*). Repeat this procedure for each new block that appears.
 2. Press N and then press Enter to start the test.
-




WERE YOU ABLE TO COMPLETE THE LIGHT PEN TEST (DISPLAY CHANGES TO VIDEO PAGE 0)?

NO Replace the light pen.

YES 

1. If you skipped the light pen test, video page 0 is not on your display yet, press Y, then Enter.
2. Video page 0 should have appeared on your display.
3. Follow the instructions on your display to check the internal video addressing function of the Color/Graphics Monitor Adapter. Look for any discrepancy in the sequence of numbers 0 through 7 and back to 0.


[illegible]

TYPE ANY KEY TO DISPLAY NEXT PAGE 

WERE ALL 8 PAGES DISPLAYED?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, “Removal/Replacement and Adjustments.”

YES



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unresolved problem, you should seek technical assistance.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Insert your Advanced Diagnostics diskette.
3. Set the Power switch on the expansion unit, (if attached) and system unit to On.
4. Press the following keys in the sequence listed and listen for the "BEEP" each time you press Enter.

Note: Use the numbers on the top row of the keyboard; do not use the numeric keypad.

Steps	Test Selection	Audio Response
1. Press 0	Run diagnostics	None
2. Press Enter		1 Beep
Note: If you do not have a monochrome adapter installed, skip steps 3 & 4.		
3. Press Y or N	Is a monitor attached to every display adapter?	None
4. Press Enter		1 Beep
5. Press Y	Are the options correct?	None
6. Press Enter		1 Beep
7. Press 0	Run test one time	None
8. Press Enter		1 Beep
9. Press 5	Select color/graphics monitor adapter tests	None
10. Press Enter		2 Beeps

WERE YOU ABLE TO COMPLETE THE AUDIO RESPONSE DIAGNOSTICS BY PRESSING THE ABOVE SEQUENCE OF KEYS?


NO You may have a power supply or connector problem. Check your connectors. If your Color/Graphics Monitor Adapter is installed in the system unit, go to PIC 3-020-1, "Power." If the adapter is in the expansion unit, go to PIC 3-1800-1, "Expansion Unit."

YES



Your display should match the screen below.

COLOR/GRAPHICS MONITOR ADAPTER TEST

0 - DISPLAY ADAPTER TEST
1 - DISPLAY ATTRIBUTES
2 - CHARACTER SET
3 - 80X25 DISPLAY
4 - 40X25 DISPLAY
5 - 320X200 GRAPHICS
6 - 640X200 GRAPHICS
7 - LIGHT PEN TEST
8 - SCREEN PAGING
9 - EXIT TO MAIN MENU
10 - RUN ALL ABOVE TESTS
11 - VIDEO TEST
12 - SYNC TEST
ENTER NUMBER OF DESIRED ACTION -  -

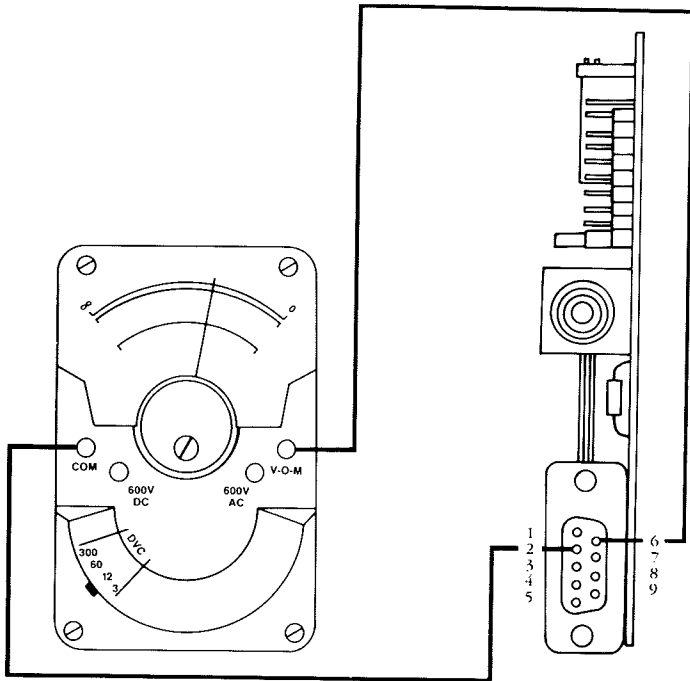
**ARE ALL CHARACTERS ON YOUR SCREEN
CORRECT AND READABLE?**

NO Replace your Color/Graphics Monitor Adapter.
See Section 5, "Removal/Replacement and
Adjustments."

Note: If your display is completely blank
continue on the next page.

YES 

1. Disconnect the color display signal cable.
2. Select 11 then press Enter.
3. Measure the voltage present between pin 2 (ground) and pins 3, 4, 5, 6 (signal) of the nine pin connector. The voltages should all read between 2.4 and 5.5 Vdc.
4. Measure the voltage present between the outer edge (ground) and the center conductor (signal) of the phono-jack. The voltage should read between 1.5 and 2.4 Vdc.

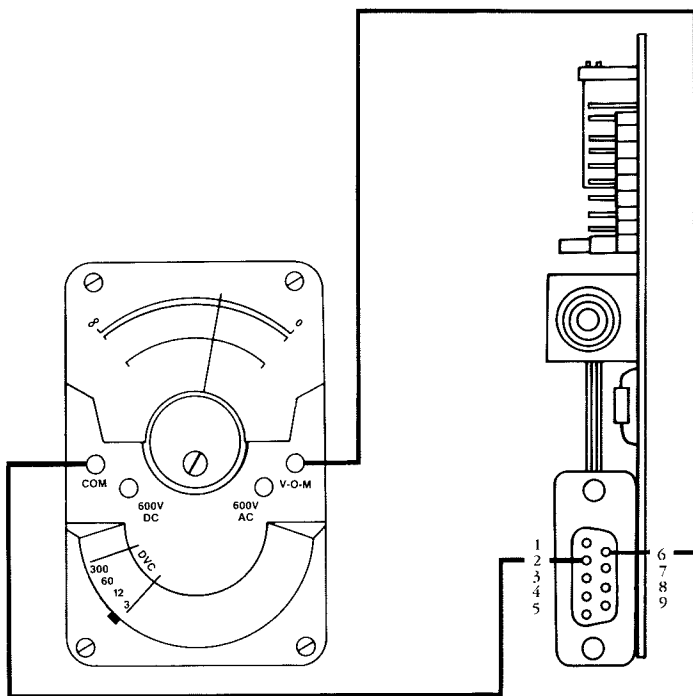


WERE ALL THE VOLTAGE READINGS CORRECT?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Press Enter.
 2. Measure the voltage present between pin 2 (ground) and pins 3, 4, 5, 6 (signal) of the nine pin connector. The voltages should all read between 0.0 and 0.5 Vdc.
 3. Measure the voltage present between the outer edge (ground) and the center conductor (signal) of the phono-jack. The voltage should read between 0.0 and 0.9 Vdc.
-



WERE ALL THE VOLTAGE READINGS CORRECT?

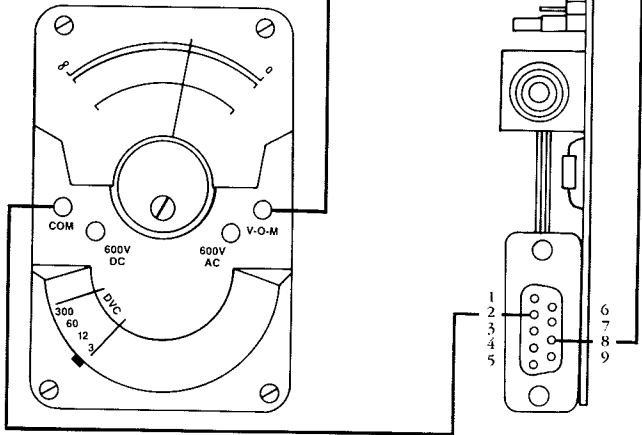
NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Press 9 and listen for two "BEEPS."
2. Measure the voltage present between pin 2 (ground) and pin 8 (signal) of the nine pin connector. The voltage should read between 0.0 and 0.7 Vdc.
3. Measure the voltage present between pin 2 (ground) and pin 9 (signal) of the nine pin connector. The voltage should read between 0.0 and 0.3 Vdc.
4. Measure the voltage present between the outer edge (ground) and the center conductor (signal) of the phono-jack. The voltage should read between 0.5 and 1.5 Vdc.

Pin	Vdc
8	0.0-0.7
9	0.0-0.3
Phono	0.5-1.5

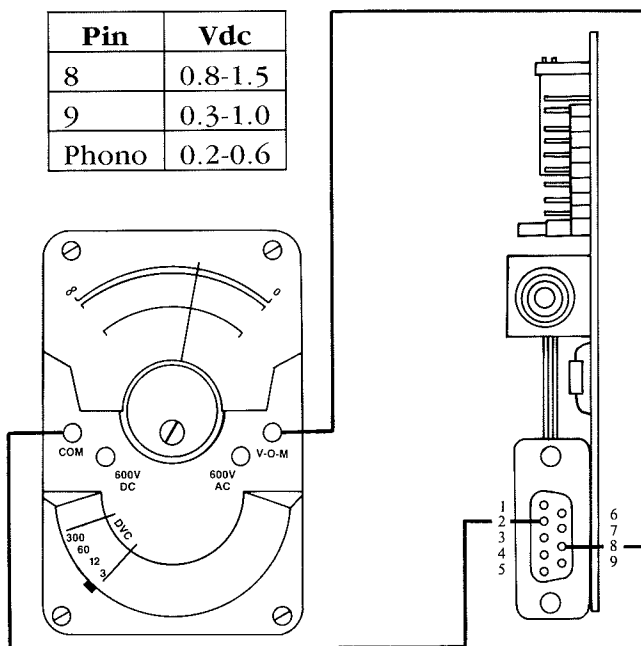


WERE ALL THE VOLTAGE READINGS CORRECT?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Select 12 then press Enter.
2. Measure the voltage present between pin 2 (ground) and pin 8 (signal) of the nine pin connector. The voltage should read between 0.8 and 1.5 Vdc.
3. Measure the voltage present between pin 2 (ground) and pin 9 (signal) of the nine pin connector. The voltage should read between 0.3 and 1.0 Vdc.
4. Measure the voltage present between the outer edge (ground) and the center conductor (signal) of the phono-jack. The voltage should read between 0.2 and 0.6 Vdc.



WERE ALL THE VOLTAGE READINGS CORRECT?

NO Replace the Color/Graphics Monitor Adapter. See Section 5, "Removal/Replacement and Adjustments."

YES Replace your color display. See Section 5, "Removal/Replacement and Adjustments."

5-1/4 Inch Diskette Drive Assembly

You have entered this PIC because you have a 6XX error code or have identified a diskette drive assembly problem. If your diskette drive assembly has visible obstructions or broken parts, remove them or replace the appropriate FRU. Check your diskette for damage.

Note: This table shows the meter readings that are acceptable, when checking for voltages described as "approximately X Vdc."

Requested Voltage Reading	Minimum	Maximum
Approximately 0 Vdc	0.0 Vdc	0.8 Vdc
Approximately 0.2 Vdc	0.2 Vdc	0.2 Vdc
Approximately 0.5 Vdc	0.5 Vdc	1.0 Vdc
Approximately 5.0 Vdc	2.0 Vdc	5.5 Vdc
Approximately 12 Vdc	11.2 Vdc	12.6 Vdc



**IS YOUR DISKETTE FREE OF DAMAGE?
FORMATTED? INSERTED CORRECTLY?**

NO Use another diskette or insert the diskette correctly, then repeat the test that failed to verify this corrected your 6XX error.

YES

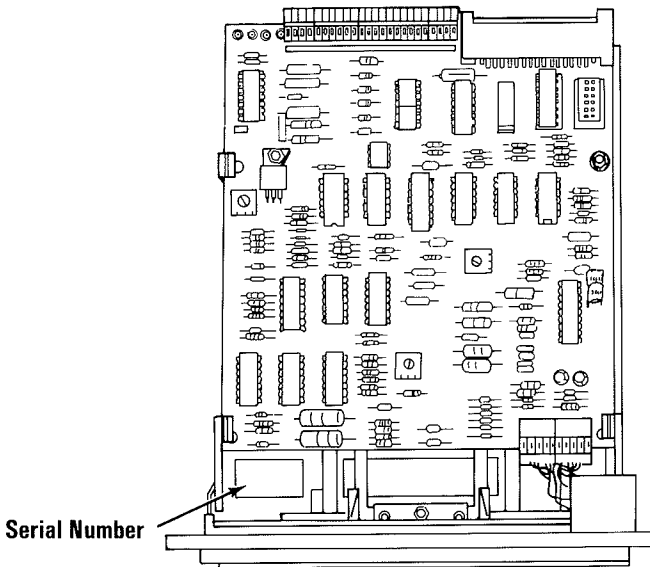


1. Refer to the illustration below and locate the serial number on the diskette drive castings. Do not remove any parts; the number is visible from the top of the drive.

Type 1 diskette drives have an A, B, or no character in front of the serial number.

Type 2 diskette drives have a D in front of the serial number.

2. Determine if your diskette drive is a type 1 or type 2 drive.

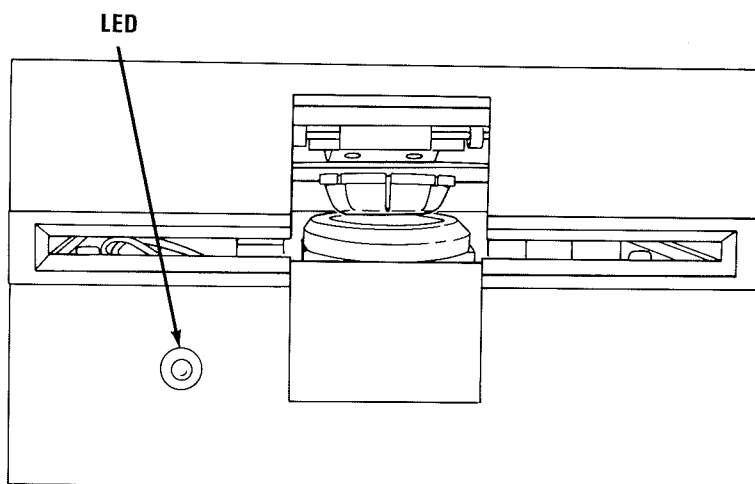


IS THE DISKETTE DRIVE A TYPE 1?

NO Go to page 3-600-41.

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Check the diskette drive connectors for damage or incorrect connection.
 3. Ensure diskette assembly mounting screws are tight.
 4. Insert your Advanced Diagnostics diskette in drive A.
 5. Set the Power switch on the expansion unit (if attached) and system unit to On and observe the LED on drive A.
-



Diskette

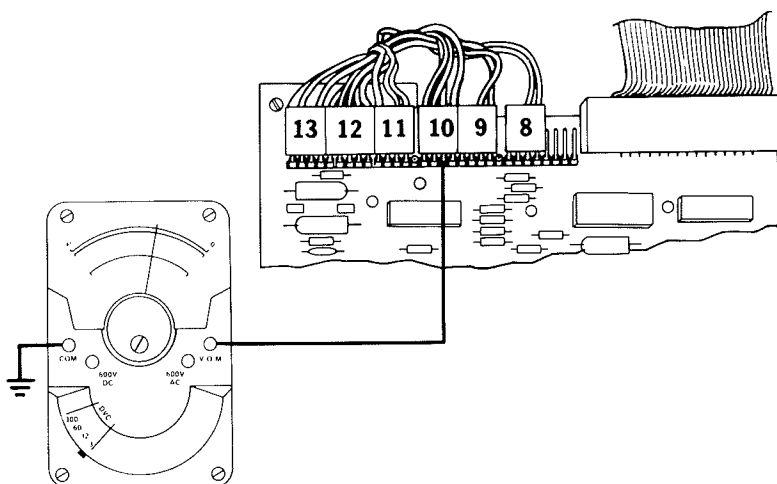
**DID THE LED ON DRIVE A LIGHT BEFORE THE
"BEEP" AT THE END OF THE POWER-ON SELF
TEST?**

NO Go to page 3-600-11.

YES 

Remove your diskette. Check the voltage from P10-2 to ground while inserting a diskette in drive A. The voltage should decrease from approximately 0.5 Vdc to approximately 0 Vdc as the diskette is inserted.

WARNING: Do not short the pins together when taking voltage readings; damage to the boards may occur.

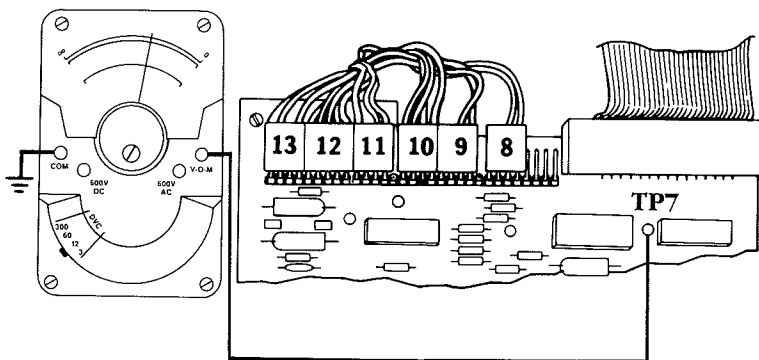


DID THE VOLTAGE DECREASE TO APPROXIMATELY 0 Vdc?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES

Remove your diskette. Check the voltage from TP-7 to ground while inserting a diskette. The voltage should decrease from approximately 5.0 Vdc to approximately 0 Vdc as the diskette is inserted.

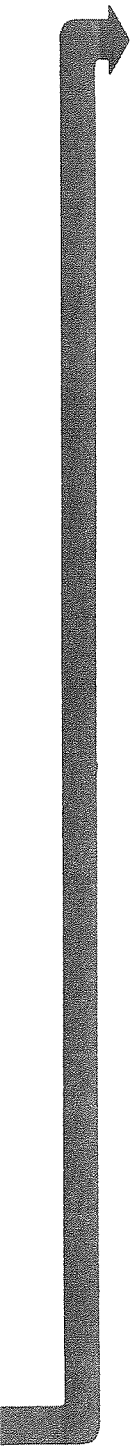


Diskette

DID THE VOLTAGE DECREASE TO APPROXIMATELY 0 Vdc?

NO Replace the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."

YES



The Advanced Diagnostics diskette should have loaded, and the first diagnostic menu should be on your display.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

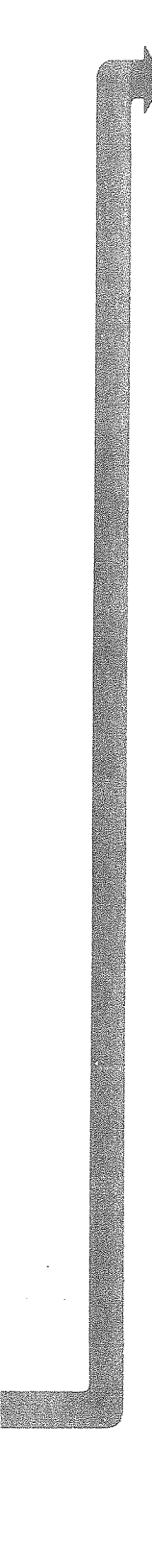
ENTER THE ACTION DESIRED

? - 

IS THIS MENU ON YOUR DISPLAY?

NO Go to page 3-600-15.

YES 



Follow the steps below to test the write protect feature.

1. Select option 1 (FORMAT DISKETTE) by pressing the 1 and then press Enter.
 2. Select the drive to be tested (A or B) and insert a scratch diskette that is write protected into the selected drive, then press Enter.
 3. The message illustrated below will be displayed if the write protect feature is working properly.
-

FORMAT NOT COMPLETED
WRITE PROTECTED DISKETTE
DRIVE B, TRACK 0, HEAD 0, SECTOR 0

Diskette

WAS THIS MESSAGE DISPLAYED?

NO Go to page 3-600-37.

YES 

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
(Skip Step 2 if you have only one display adapter installed.)
2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter (if the list is incorrect, follow the instructions on the screen to correct the list before answering yes).
4. Press 1 (RUN TESTS MULTIPLE TIMES) then press Enter.
5. Press 6 (X DISKETTE DRIVE(S) AND ADAPTER) then press Enter.
6. Press 1 (ENTER NUMBER OF TIMES TO RUN TESTS) then press Enter.
7. Press Y (WAIT EACH TIME AN ERROR OCCURS (Y/N) ?) then press Enter.

611 TIME OUT
80210200090006
0301020005

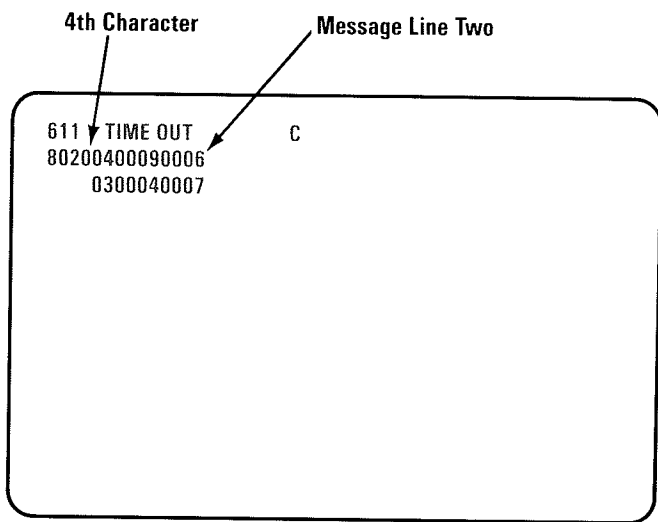
C

**DID AN ERROR CODE SIMILAR TO THIS
APPEAR?**

NO Go to page 3-600-34.

YES

The fourth character in line 2 indicates which diskette drive is failing. If the character is a 0, the failure is with drive A. If the character is a 1, the failure is with drive B.



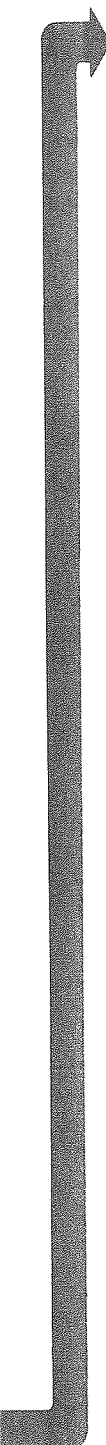
Diskette

IS THE FOURTH CHARACTER OF LINE TWO A 0?

NO Set the Power switch on the system unit (and expansion unit, if attached) to Off. Exchange the signal cable connectors for drives A and B. (The drive that was drive B will now be recognized by the machine as drive A.) Go to page 3-600-2.

If you still have the same failure after exchanging connectors go to page 3-600-35.

YES



Repeat steps 1 thru 7 on page 3-600-8 using another formatted diskette. Then return to this page.

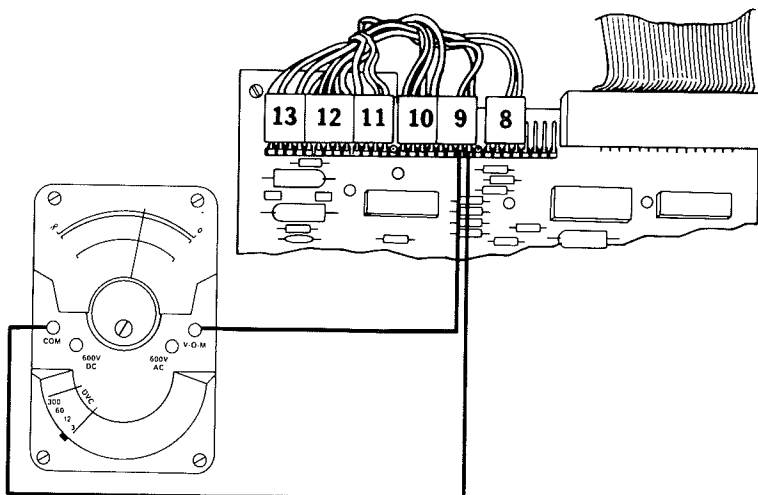
Error Code	Page
606	3-600-32
607	3-600-37
608	3-600-32
611	3-600-32
612	3-600-31
613	3-600-31
621	3-600-31
622	3-600-31
623	3-600-31
624	3-600-31
625	3-600-31
626	3-600-31

DO YOU STILL HAVE AN ERROR?

NO Replace the diskette you used for the first test.

YES Find your error code in the table and go to the page listed.

You may have a bad LED. If the diagnostic routines run correctly but the LED does not light, check for a minimum voltage of 1.5 Vdc between P9-1 and P9-2 on the diskette drive printed circuit board when the spindle is turning.



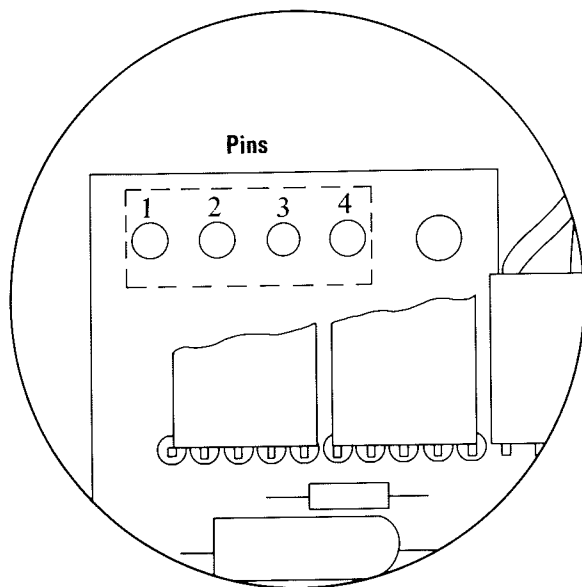
Diskette

DID THE LED FAIL TO LIGHT, BUT THE DIAGNOSTICS RAN CORRECTLY AND THE VOLTAGE MEASURED AT LEAST 1.5 Vdc?

NO Continue on the next page.

YES Replace the LED assembly. See Section 5, "Removal/Replacement and Adjustments."

Check the power connector on diskette drive A for the voltages listed in the table below.



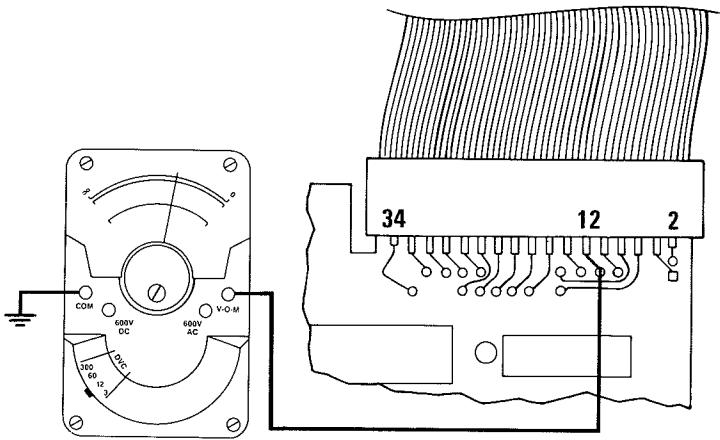
Diskette Drive Power Connector			
Min Vdc	Max Vdc	-Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1

**ARE THE VOLTAGES WITHIN THE LIMITS
SHOWN IN THE TABLE?**

NO Go to PIC 3-020-1, "Power."

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Ensure the terminating resistor is correctly inserted. It should be installed in the printed circuit board of drive A and should not be in the printed circuit board of drive B. See Section 4, "Locations."
 3. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 4. Check the voltage at pin 12 on the diskette signal cable's connector for approximately 5.0 Vdc at the start of POST.
-



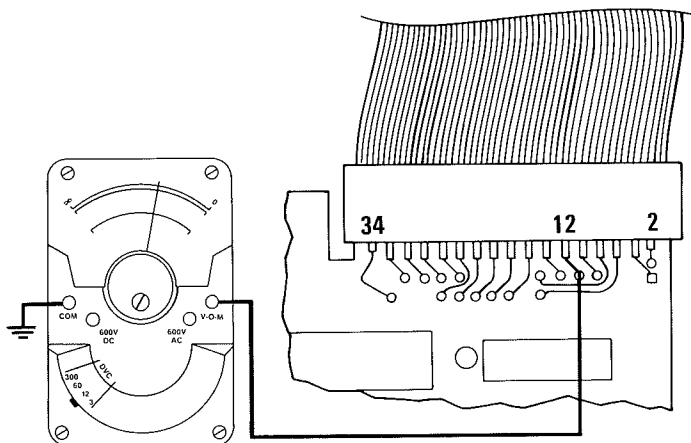
Diskette

WAS THE VOLTAGE APPROXIMATELY 5.0 Vdc AT THE START OF POST?

NO Replace the diskette drive printed circuit board.
(See Section 5, "Removal/Replacement and Adjustments.")

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 3. Check that the voltage at pin 12 on the signal cable's connector decreases from approximately 5.0 Vdc at the start of POST, to approximately 0 Vdc during POST.
-

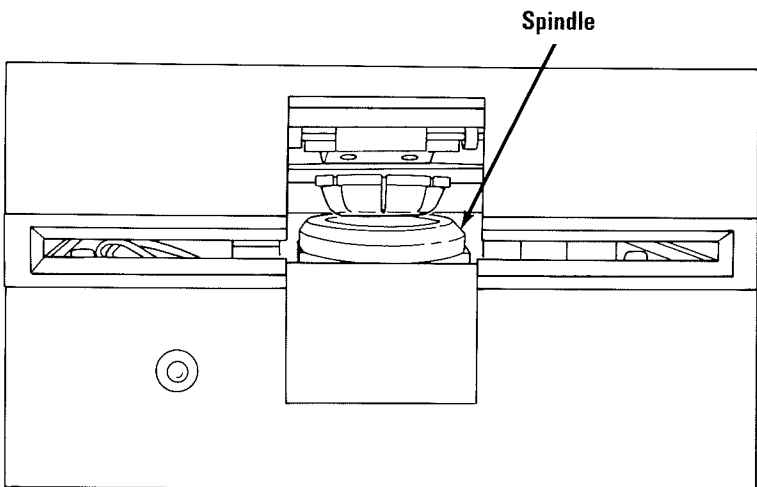


**DID THE VOLTAGE DECREASE TO
APPROXIMATELY 0 Vdc DURING POST?**

NO Go to page 3-600-35.

YES Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

1. Remove the diskette.
 2. Set the Power switch on the system unit (and expansion unit, if attached) to Off and wait 5 seconds.
 3. Set the Power switch on the expansion unit (if attached) and system unit to On.
 4. Observe the spindle during POST.
-



Front View-Diskette Drive

DID THE SPINDLE BEGIN TO ROTATE ON DRIVE A BEFORE THE "BEEP" AT THE END OF POST?

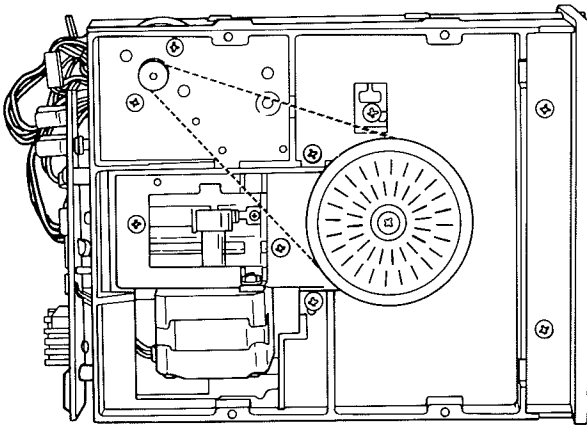
NO Go to page 3-600-24.

YES



Use the drive motor preliminary speed test to check the speed of the diskette drive. See Section 5, "Removal/Replacement and Adjustments."

Note: A fluorescent light is needed to see the strobe effect on this test.




**WAS THE SPEED OF THE DISKETTE DRIVE
CORRECT?**

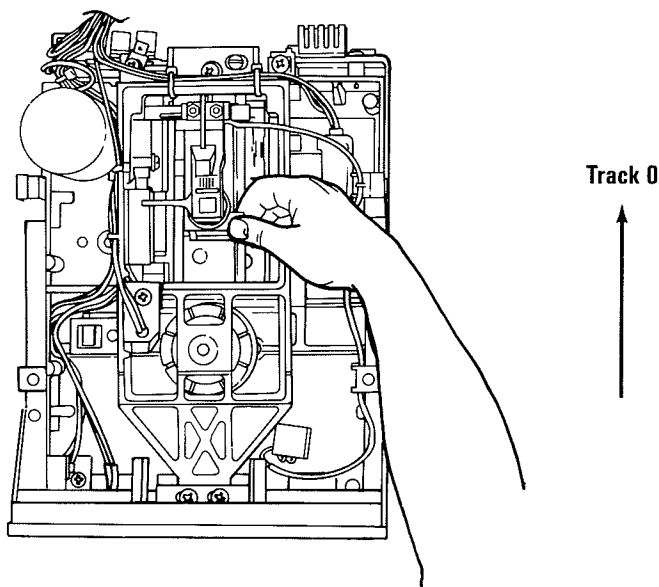
NO Adjust the speed of the diskette drive. If unable to adjust go to page 3-600-26.

YES



- 
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Move the read/write head assembly to the rear of the diskette drive assembly until it reaches track 0.

Note: The head is moved under power by a stepper motor. When you move the head by hand, you will feel some resistance, but the head should not bind.



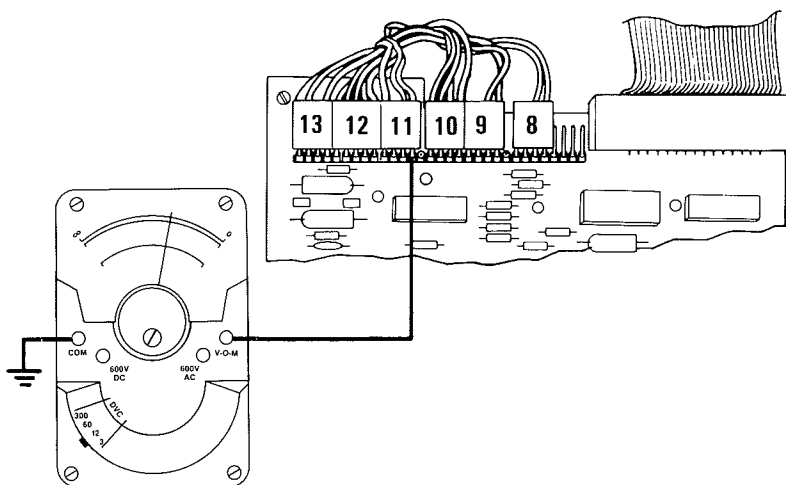
DID THE HEAD MOVE TO TRACK 0 WITH NO BINDS?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES 

1. With the head still at track 0, reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Check the voltage at P11-1. It should be approximately 0 Vdc before the LED lights at the end of POST.

Note: The head may move away from track 0 during this test. If you run this test a second time, reposition the head to track 0.



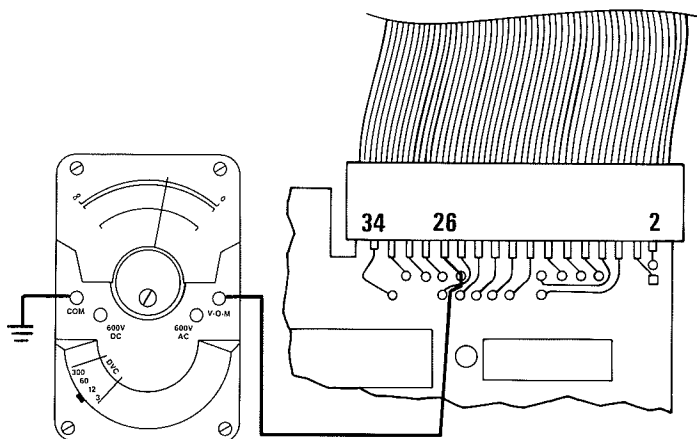
IS THE VOLTAGE CORRECT?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Move the read/write head assembly to the rear of the diskette drive assembly until it reaches track 0.
 4. Reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 5. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 6. The voltage at pin 26 on the signal cable's connector should be 5.0 Vdc at the start of POST.
-



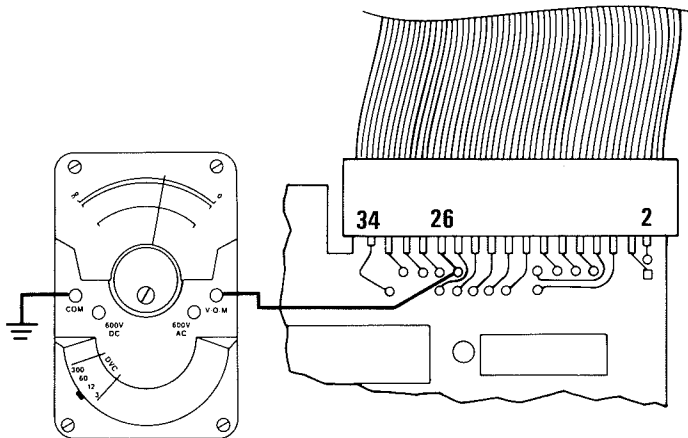
Diskette

WAS THE VOLTAGE APPROXIMATELY 5.0 Vdc AT THE START OF POST?

NO Go to page 3-600-35.

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Move the read/write head assembly to the rear of the diskette drive assembly until it reaches track 0.
 4. Reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 5. Set the Power switch on the expansion unit (if attached) and system unit to On.
 6. The voltage at pin 26 on the signal cable's connector should read approximately 5.0 Vdc at the start of POST and should decrease to approximately 0 Vdc as the LED lights at the end of POST.
-



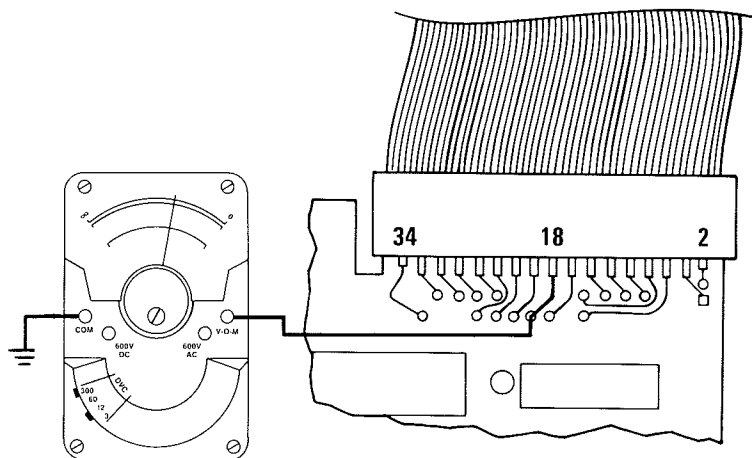
**DID THE VOLTAGE DECREASE TO
APPROXIMATELY 0 Vdc?**

NO Replace the diskette drive printed circuit board.
See Section 5, "Removal/Replacement and
Adjustments."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Ensure the terminating resistor is correctly inserted. It should be installed in the printed circuit board of drive A and should not be in the printed circuit board of drive B. See Section 4, "Locations."
 3. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 4. Check the voltage at pin 18 of the signal cable's connector. The voltage should be approximately 5.0 Vdc at the start of POST and should decrease to approximately 0 Vdc before the "beep" at the end of the POST.
-



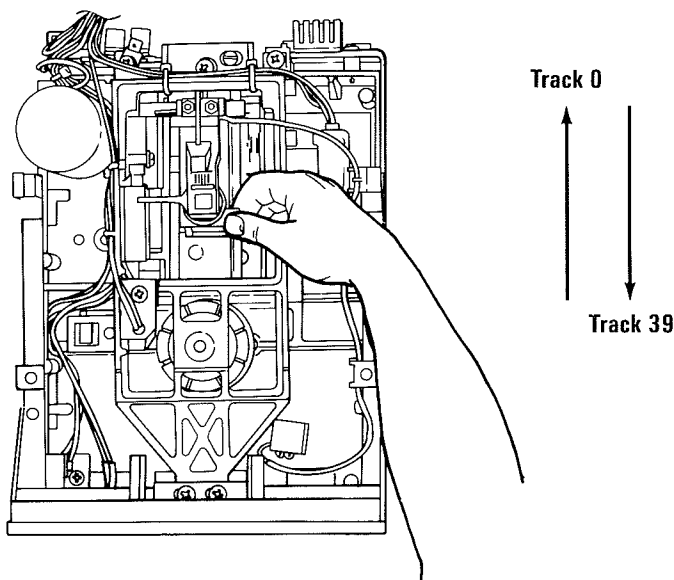
Diskette

DID THE VOLTAGE AT PIN 18 DECREASE TO APPROXIMATELY 0 Vdc?

NO Go to page 3-600-35.

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Partially remove the diskette drive printed circuit board. Leave all connectors on except P5 and P6. See Section 5, "Removal/Replacement and Adjustments."
 3. Lift the diskette drive printed circuit board just enough to observe the head assembly.
 4. Move the head assembly away from track 0.
 5. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 6. Observe the motion of the head assembly.
-



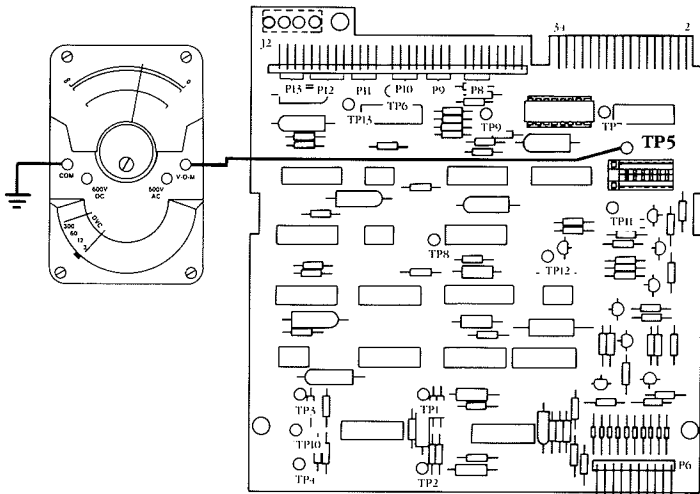
DOES THE HEAD ASSEMBLY MOVE TO TRACK 0 AND THEN AWAY FROM IT BEFORE THE END OF THE POST?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Reinstall the diskette drive printed circuit board, P5 and P6. See Section 5, "Removal/Replacement and Adjustments."
3. Insert your Advanced Diagnostics diskette.
4. Set the Power switch on the expansion unit (if attached) and the system unit to On.
5. Check for an increase in voltage (approximately 0.2 Vdc) at TP-5 of the diskette drive printed circuit board while the LED is on during POST.

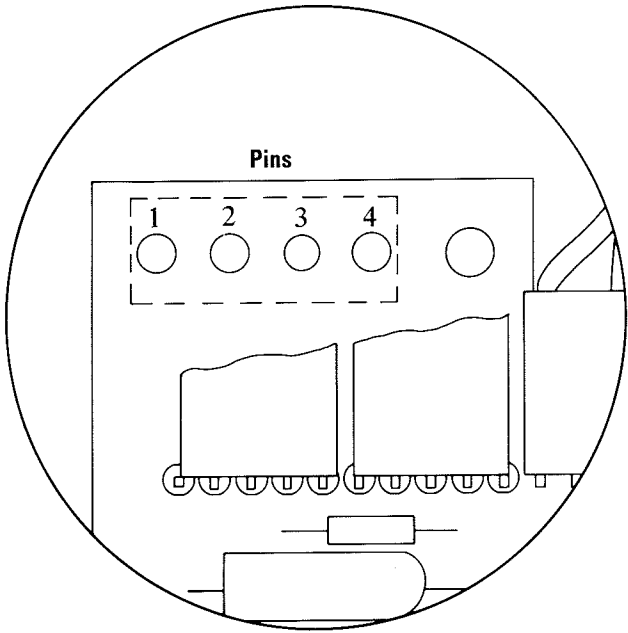


DOES THE VOLTAGE AT TP-5 INCREASE WHEN THE LED IS ON?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-600-35.

Check the diskette drive's power connector for the voltages listed in the table below.



Diskette Drive Power Connector			
Min Vdc	Max Vdc	- Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1

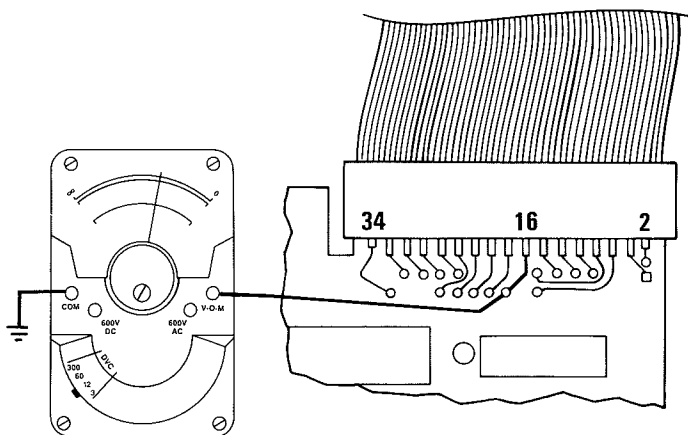
ARE THE VOLTAGES WITHIN THE LIMITS SHOWN IN THE TABLE?

NO Go to PIC 3-020-1, "Power."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 3. Check for the voltage at pin 16 on the signal cable's connector. The voltage should be approximately 5.0 Vdc at the start of POST and should decrease to approximately 0 Vdc before the "BEEP" at the end of POST.
-



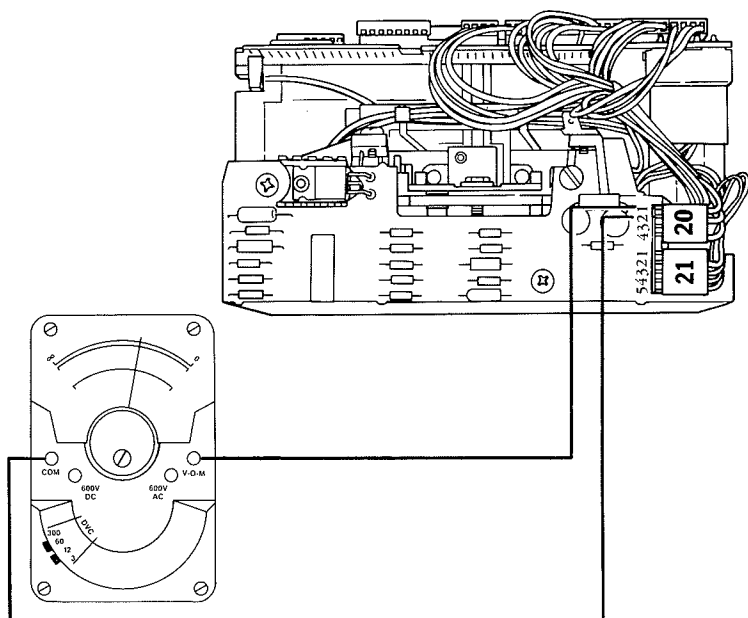
Diskette

DID THE VOLTAGE AT PIN 16 DECREASE TO APPROXIMATELY 0 Vdc?

NO Go to page 3-600-35.

YES

Check for a voltage of approximately 12 Vdc between P20-1 and P20-2 on the servo board.



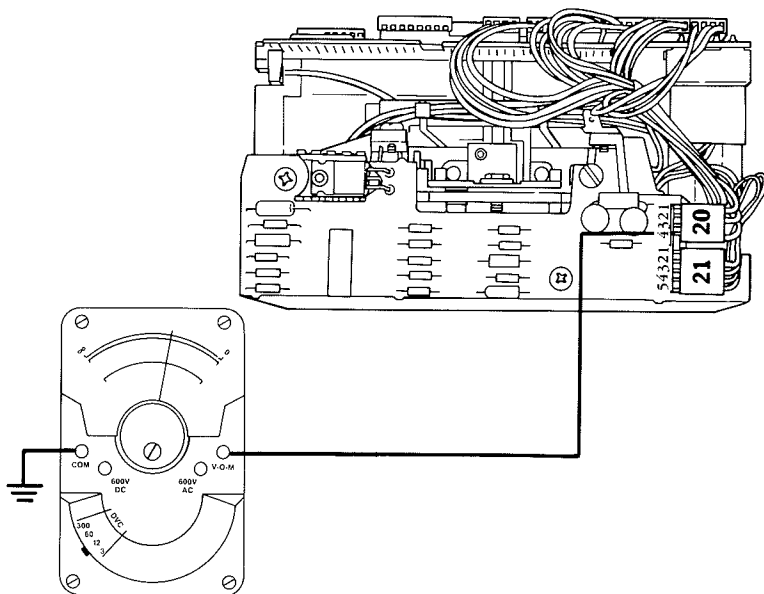
IS THE VOLTAGE APPROXIMATELY 12 Vdc?

NO Replace the diskette drive printed circuit board.
See Section 5, "Removal/Replacement and Adjustments."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Check the voltage at P20-4. It should start at approximately 5.0 Vdc and should decrease to approximately 0 Vdc when the LED is on.



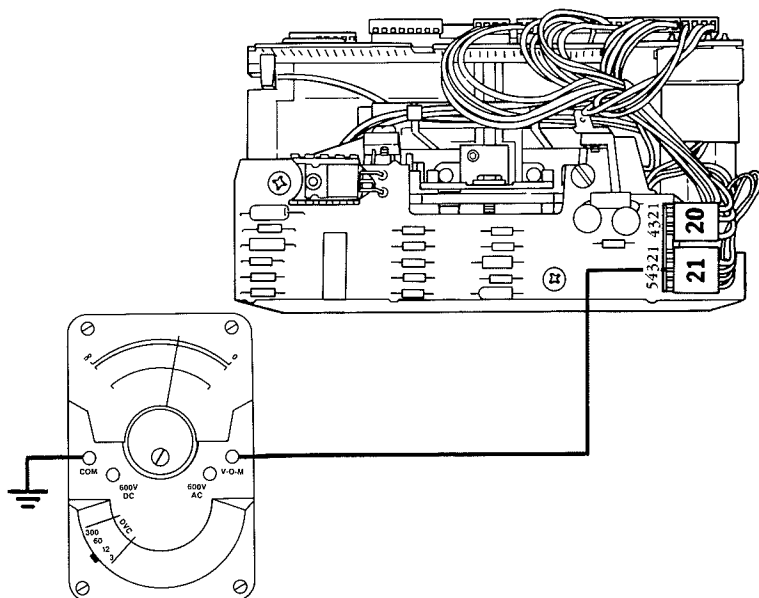
Diskette

DID THE VOLTAGE AT P20-4 DECREASE TO APPROXIMATELY 0 Vdc?

NO Replace the diskette drive printed circuit board.
See Section 5, "Removal/Replacement and Adjustments."

YES

Check for a voltage of 3 Vdc to 9 Vdc at P21-3 when the LED is on.



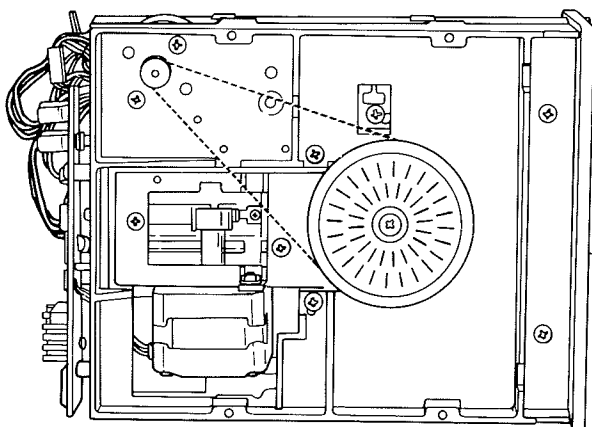
IS THE VOLTAGE CORRECT?

NO Replace the servo board. See Section 5, "Removal/Replacement and Adjustments."

YES



Check the diskette drive belt.



Bottom View

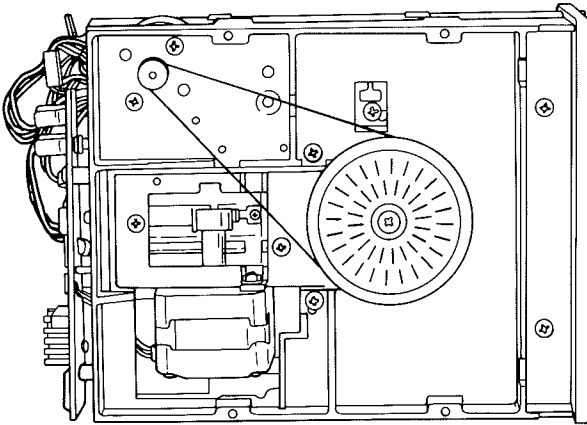
Diskette

**IS THE DRIVE BELT INSTALLED ON THE PULLEYS
CORRECTLY AND IN GOOD CONDITION?**

NO Replace the drive belt. See Section 5, "Removal/
Replacement and Adjustments."

YES

Remove the diskette drive belt and turn the spindle to ensure it turns freely and without binds.



Bottom View

DOES THE SPINDLE TURN FREELY?

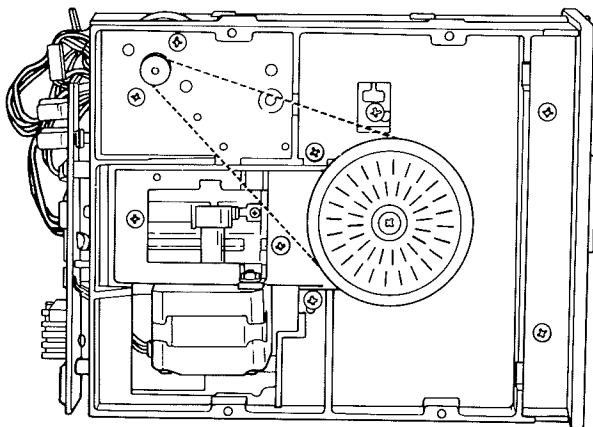
NO Replace the spindle assembly. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the diskette drive motor. See Section 5, "Removal/Replacement and Adjustments."

1. Use the drive motor preliminary speed adjustment to check the diskette drive speed. See Section 5, "Removal/Replacement and Adjustments." Adjust the speed if necessary.

Note: A fluorescent light is needed to see the strobe effect on this test.

2. Refer to steps 1 thru 7 on page 3-600-8 to run diagnostic tests on a formatted diskette. Then return to this page.



Diskette

DO YOU STILL HAVE AN ERROR CODE?

NO Run diagnostic tests to verify you have fixed the problem.

YES Go to page 3-600-32 and follow the instructions for your error code.

Do not use this table, unless you are directed here by an earlier step in this PIC.

Diskette Drive Error Codes

Error Code	Probable Cause	Corrective Action
606	Your signal cable, diskette drive adapter, or diskette drive assembly has failed.	Go to page 3-600-35 and check the continuity of the signal cable. If you still have the same error replace the diskette drive. See Section 5, "Removal/Replacement and Adjustments."
607	Write Protect Error	Go to page-3-600-37
608	There is a problem with your Advanced Diagnostics diskette.	Use your backup copy of the Advanced Diagnostics diskette.
611	Your signal cable, diskette drive adapter, or diskette drive has failed.	Go to page 3-600-35 and check the continuity of the signal cable. If you have the same error replace the diskette drive. See Section 5, "Removal/Replacement and Adjustments."

Do not use this table, unless you are directed here by an earlier step in this PIC.

Diskette Drive Error Codes

Error Code	Probable Cause	Corrective Action
612	Your signal cable or diskette drive adapter has failed.	Go to page 3-600-35.
613	Your signal cable or diskette drive adapter has failed.	Go to page 3-600-35.
621 622 623 624 625 626	Your signal cable, diskette drive adapter, or diskette drive has failed.	Go to page 3-600-35 and check the continuity of the signal cable. If you still have the same error replace the diskette drive. See Section 5, "Removal/Replacement and Adjustments."

Insert a scratch diskette in each diskette drive and then press Enter.

The screen will display the configuration of the diskette drive(s) installed in your system. The XXXKB is the type of drive(s), 160KB or 320KB.

Note: 160KB drives do not have a read/write head connected to P5. See Section 4, "Locations."

TESTING - 1 DISKETTE DRIVE(S) AND ADAPTER
DISKETTE A: IS A 320KB DRIVE
1 DISKETTE DRIVE(S) AND ADAPTER 600S

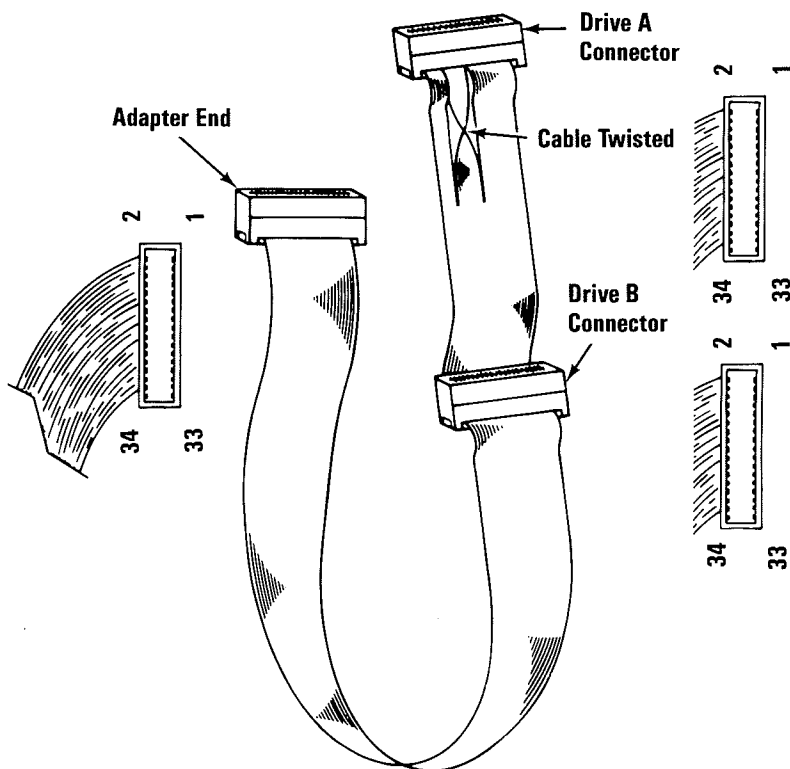
ARE THE DISKETTE DRIVE(S) CORRECT?

NO Replace the diskette drive assembly that is shown incorrectly in the message. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-600-40.

You may have a bad connection or a broken wire. Perform the following continuity check of the diskette drive signal cable.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Disconnect the diskette drive signal cable from the diskette adapter and the diskette drive.
3. Carefully inspect the cable connectors for bent or broken contacts. Inspect the connectors on the adapter and on the diskette drive's printed circuit board for cracks or corrosion.
4. Set meter on the Ohms (x1) scale.
5. Refer to the tables on the next page and check the continuity of the signal cable. The meter should indicate approximately 0 ohms resistance.



Diskette

Note: Check continuity pin number to pin number except the pins preceded by an asterisk.

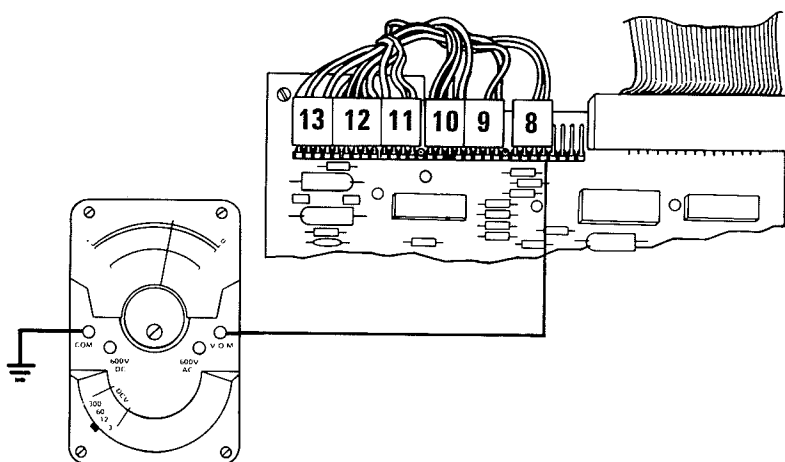
Diskette Drive A Signal-Cable Connector		Diskette Drive B Signal-Cable Connector	
Even Pin Numbering Diskette	Adapter	Even Pin Numbering Diskette	Adapter
2	2	2	2
4	4	4	4
6	6	6	6
8	8	8	8
*10	16	10	10
*12	14	12	12
*14	12	14	14
*16	10	16	16
18	18	18	18
20	20	20	20
22	22	22	22
24	24	24	24
26	26	26	26
28	28	28	28
30	30	30	30
32	32	32	32
34	34	34	34
Odd Pin Numbering Diskette	Adapter	Odd Pin Numbering Diskette	Adapter
1	1	1	1
3	3	3	3
5	5	5	5
7	7	7	7
9	9	9	9
*11	15	11	11
13	13	13	13
*15	11	15	15
17	17	17	17
19	19	19	19
21	21	21	21
23	23	23	23
25	25	25	25
27	27	27	27
29	29	29	29
31	31	31	31
33	33	33	33

**WAS THE CONTINUITY OF THE SIGNAL CABLE
CORRECT?**

NO Replace the signal cable. See Section 5, "Removal/
Replacement and Adjustments."

YES Replace the diskette drive adapter. See Section 5,
"Removal/Replacement and Adjustments."

1. Remove your diskette.
 2. Check the voltage from P8-1 to ground while partially inserting and removing a diskette from the drive. This will operate the write protect switch. The voltage should increase from approximately 0 Vdc to approximately 5.0 Vdc each time the switch is operated.
-



Diskette

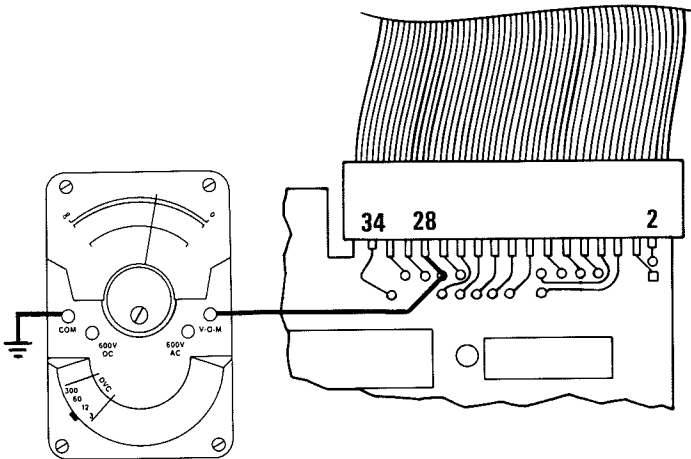
DID THE VOLTAGE INCREASE FROM APPROXIMATELY 0 Vdc TO APPROXIMATELY 5.0 Vdc EACH TIME THE SWITCH WAS OPERATED?

NO Replace the write protect switch. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Remove your diskette.
 2. Check the voltage at J1-28. The voltage should be approximately 5.0 Vdc.
-



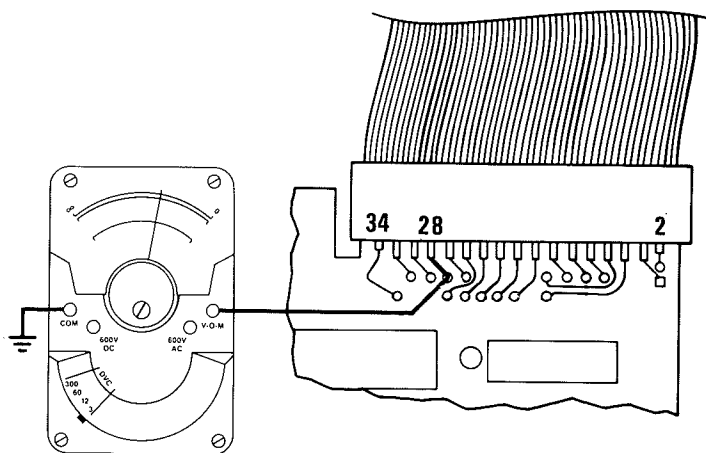
IS THE VOLTAGE APPROXIMATELY 5.0 Vdc?

NO Go to page 3-600-35.

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Partially insert and remove a diskette from the diskette drive to operate the write protect switch, and measure the voltage at J1-28 when the LED is lit. The voltage should be approximately 5.0 Vdc and decrease to approximately 0 Vdc each time the write protect switch is operated. To test drive B exchange the signal cable connectors and perform the same steps.



Diskette

DID THE VOLTAGE CHANGE FROM APPROXIMATELY 5.0 Vdc TO APPROXIMATELY 0 Vdc EACH TIME THE WRITE PROTECT SWITCH WAS OPERATED WHILE THE LED WAS LIT?

NO Replace the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."

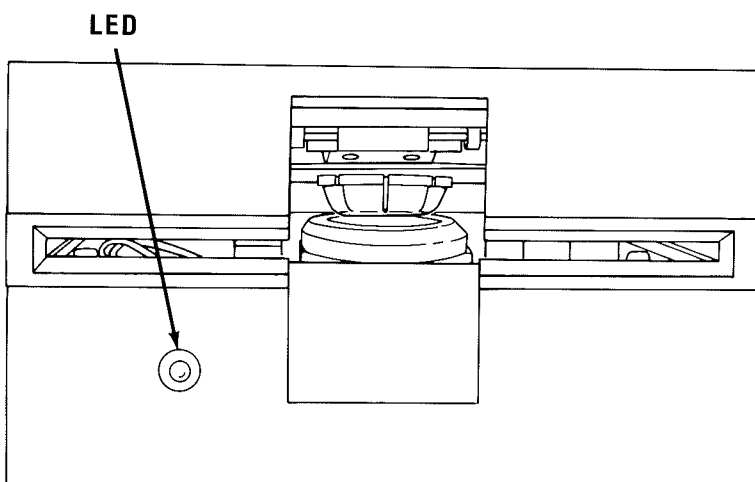
YES Replace the diskette drive adapter. See Section 5, "Removal/Replacement and Adjustments."

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Check the diskette drive connectors for damage or incorrect connection.
 3. Ensure diskette assembly mounting screws are tight.
 4. Insert your Advanced Diagnostics diskette in drive A.
 5. Set the Power switch on the expansion unit (if attached) and system unit to On and observe the LED on drive A.
-



**DID THE LED ON DRIVE A LIGHT BEFORE THE
“BEEP” AT THE END OF THE POWER-ON SELF
TEST?**

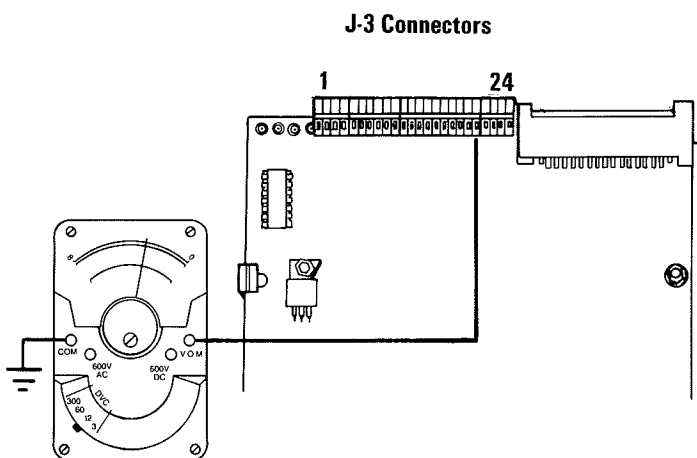
NO Go to page 3-600-49.

YES



1. Remove your diskette.
2. Check the voltage from J3-20 to ground while inserting a diskette in drive A. The voltage should be approximately 0 Vdc and increase to approximately 5.0 Vdc as the diskette is inserted.

WARNING: Do not short the pins together when taking voltage readings; damage to the boards may occur.

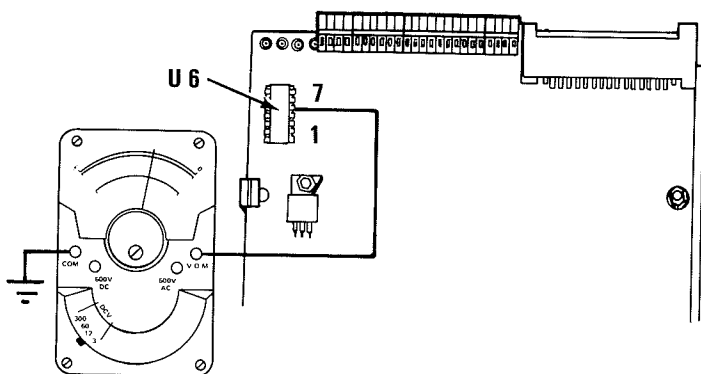


**DID THE VOLTAGE INCREASE TO
APPROXIMATELY 5 Vdc?**

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Remove your diskette.
 2. Check the voltage from U6-pin 5 to ground while inserting a diskette. The voltage should decrease from approximately 5.0 Vdc to approximately 0 Vdc as the diskette is inserted.
-



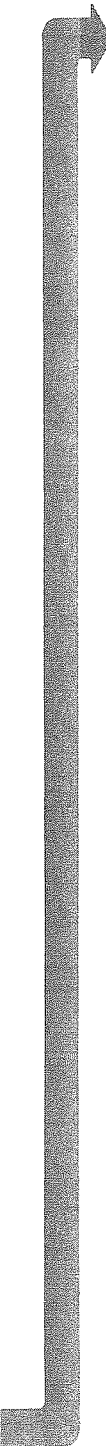
Diskette

DID THE VOLTAGE DECREASE TO APPROXIMATELY 0 Vdc?

NO Replace the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."

YES





The Advanced Diagnostics diskette should have loaded, and the first diagnostic menu should be on your display.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX(C) Copyright IBM Corp 1981, 1982

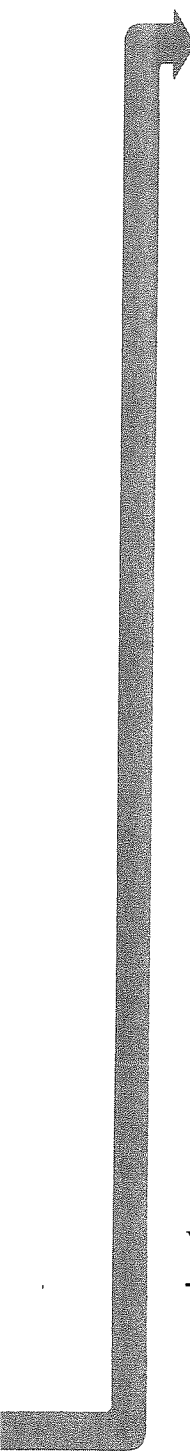
SELECT AN OPTION

0 - RUN DIAGNOSTIC ROUTINES
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR RELOCATION
9 - EXIT TO SYSTEM DISKETTE
ENTER THE ACTION DESIRED
? _

IS THIS MENU ON YOUR DISPLAY?

NO Go to page 3-600-53.

YES 



Follow the steps below to test the write protect feature.

1. Select option 1 (FORMAT DISKETTE) by pressing the 1 and then press Enter.
 2. Select the drive to be tested (A or B) and insert a scratch diskette that is write protected into the selected drive, then press Enter.
 3. The message illustrated below will be displayed if the write protect feature is working properly.
-

FORMAT NOT COMPLETED
WRITE PROTECTED DISKETTE
DRIVE B, TRACK 0, HEAD 0, SECTOR 0

Diskette

WAS THIS MESSAGE DISPLAYED?

NO Go to page 3-600-73.

YES 

Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you have only one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is incorrect, follow the instructions on the screen to correct the list before answering yes).
4. Press 1 (RUN TESTS MULTIPLE TIMES) then press Enter.
5. Press 6 (X DISKETTE DRIVE(S) AND ADAPTER) then press Enter.
6. Press 1 (ENTER NUMBER OF TIMES TO RUN TESTS) then press Enter.
7. Press Y (WAIT EACH TIME AN ERROR OCCURS (Y/N) ?) then press Enter.

611 TIME OUT C
80210200090006
0301020005

**DID AN ERROR CODE SIMILAR TO THIS
APPEAR?**

NO Go to page 3-600-70.

YES 

The fourth character in line 2 indicates which diskette drive is failing. If the character is a 0, the failure is with drive A. If the character is a 1, the failure is with drive B.

4th Character of Message Line 2

61 TIME OUT
80200400090006
0300040007

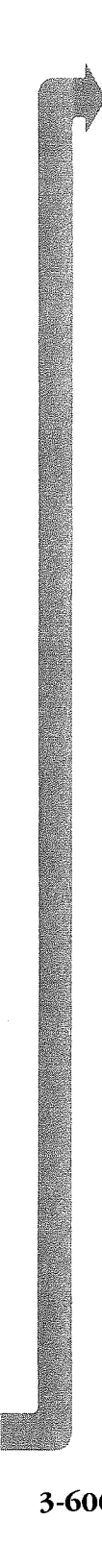
Diskette

IS THE FOURTH CHARACTER OF LINE TWO A 0?

NO Set the Power switch on the system unit (and expansion unit, if attached) to Off.
Exchange the signal cable connectors for drives A and B (the drive that was drive B will now be recognized by the machine as drive A). Go to page 3-600-2.

If you still have the same failure after exchanging connectors, go to page 3-600-71.

YES



Repeat steps 1 through 7 on page 3-600-46 using another formatted diskette. Then return to this page.

Error Code	Page
606	3-600-68
607	3-600-73
608	3-600-68
611	3-600-68
612	3-600-67
613	3-600-67
621	3-600-67
622	3-600-67
623	3-600-67
624	3-600-67
625	3-600-67
626	3-600-67

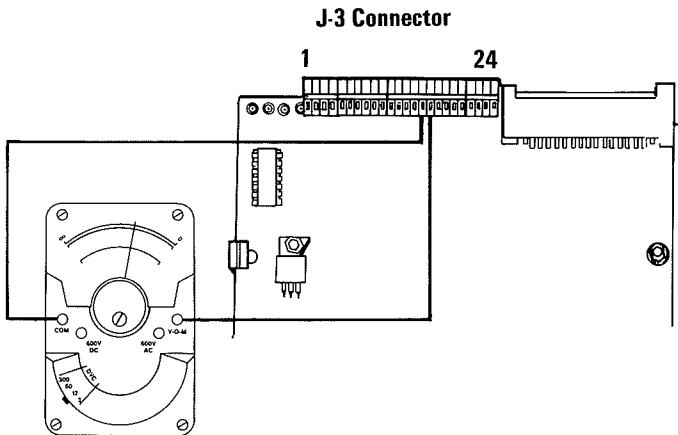
DO YOU STILL HAVE AN ERROR?

NO Replace the diskette you used for the first test.

YES Find your error code in the table and go to the page listed.

If the diagnostic routines run correctly but the LED does not light, you may have a bad LED.

1. Connect the voltage lead of your meter to J3-16 and the common lead to J3-15 of the diskette printed circuit board.
 2. Check for a minimum of 1.5 Vdc when the spindle is turning.
-



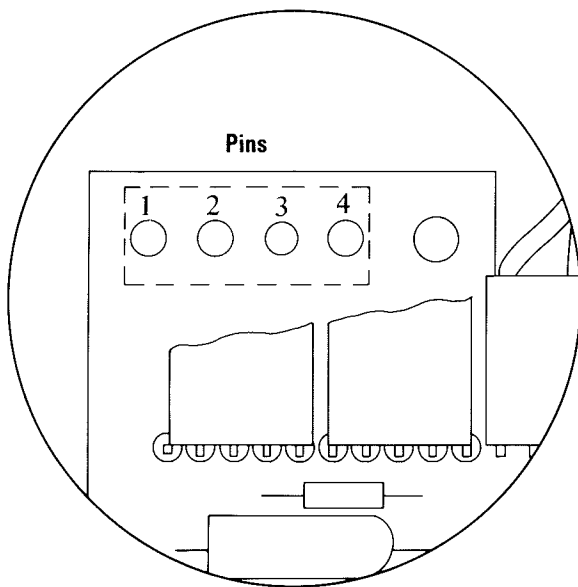
Diskette

DID THE LED FAIL TO LIGHT, BUT THE DIAGNOSTICS RAN CORRECTLY, AND THE VOLTAGE MEASURED AT LEAST 1.5 Vdc?

NO Continue on the next page.

YES Replace the LED assembly. See Section 5, "Removal/Replacement and Adjustments."

Check the power connector on diskette drive A for the voltages listed in the table below.



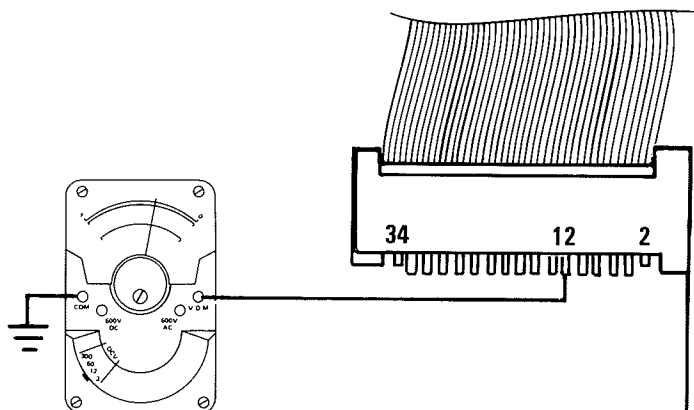
Diskette Drive Power Connector			
Min Vdc	Max Vdc	- Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1

**ARE THE VOLTAGES WITHIN THE LIMITS
SHOWN IN THE TABLE?**

NO Go to PIC 3-020-1, "Power."

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Ensure the terminating resistor is correctly inserted. It should be installed in the printed circuit board of drive A and should not be in the printed circuit board of drive B. See Section 4, "Locations."
 3. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 4. Check the voltage at pin 12 on the diskette signal cable's connector for approximately 5.0 Vdc at the start of POST.
-



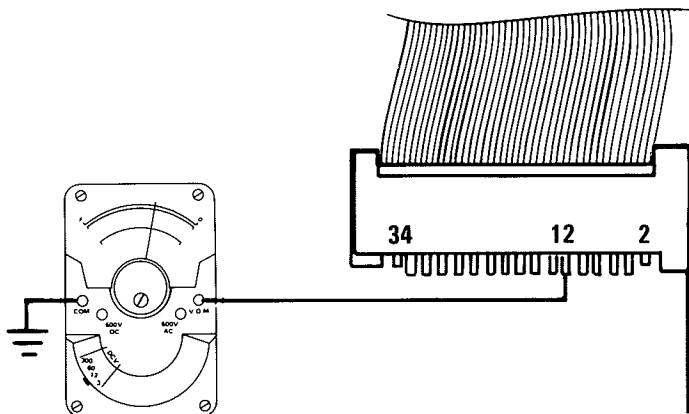
Diskette

WAS THE VOLTAGE APPROXIMATELY 5.0 Vdc AT THE START OF POST?

NO Replace the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 3. Check that the voltage at pin 12 on the signal cable connector decreased from approximately 5.0 Vdc at the start of POST, to approximately 0 Vdc during POST.
-

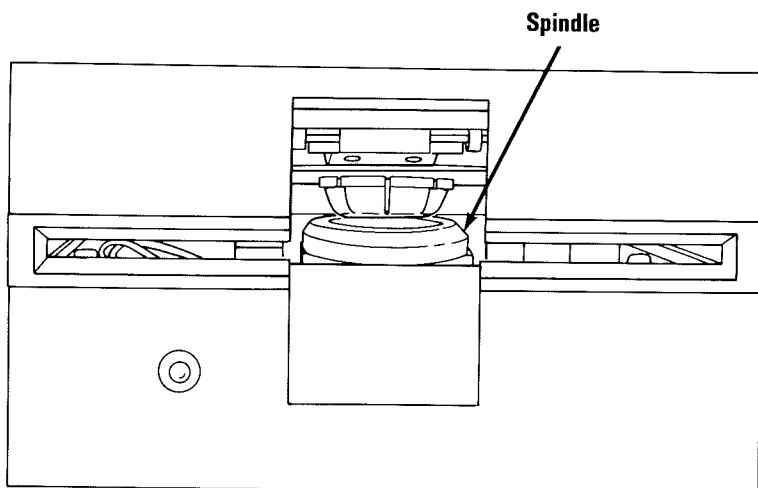


**DID THE VOLTAGE DECREASE TO
APPROXIMATELY 0 Vdc DURING POST?**

NO Go to page 3-600-71.

YES Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

1. Remove the diskette.
 2. Set the Power switch on the system unit (and expansion unit, if attached) to Off and wait 5 seconds.
 3. Set the Power switch on the expansion unit (if attached) and system unit to On.
 4. Observe the spindle during POST.
-



Front View-Diskette Drive

DID THE SPINDLE BEGIN TO ROTATE ON DRIVE A BEFORE THE "BEEP" AT THE END OF POST?

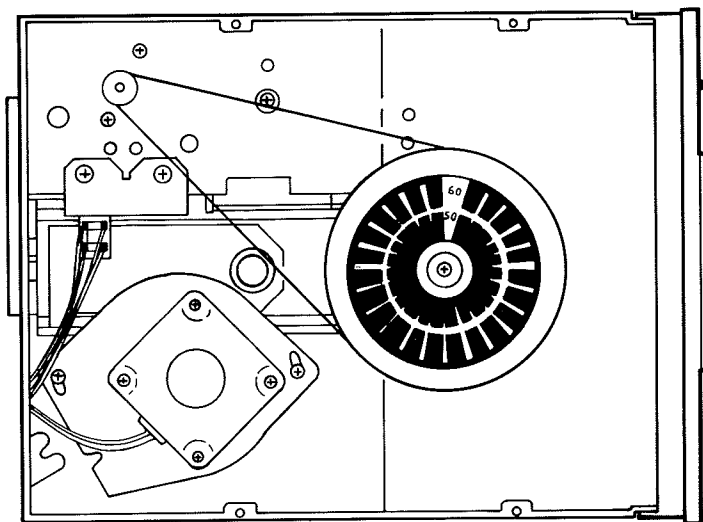
NO Go to page 3-600-62.

YES



Use the drive motor preliminary speed adjustment to check the speed of the diskette drive. See Section 5 "Removal/Replacement and Adjustments."

Note: A fluorescent light is needed to see the strobe effect on this test.




**WAS THE SPEED OF THE DISKETTE DRIVE
CORRECT?**

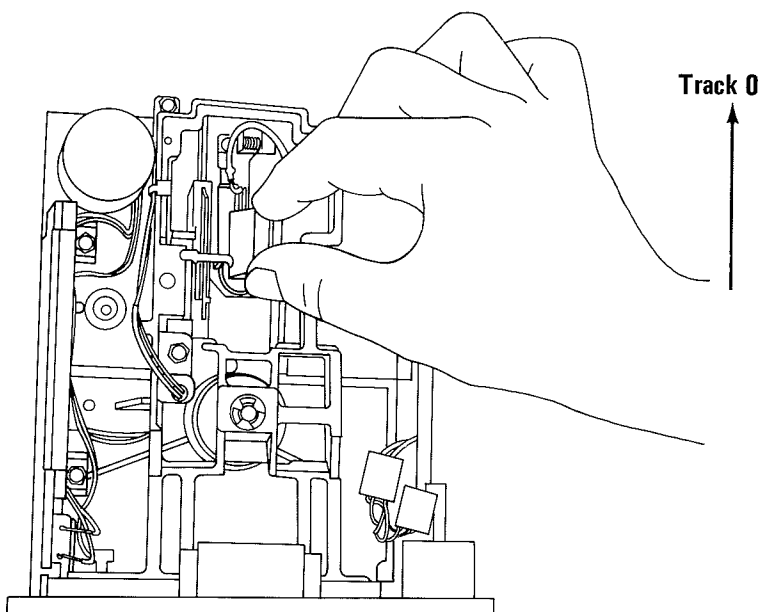
NO Adjust the speed of the diskette drive. If unable to adjust, go to page 3-600-64.

YES



- 
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Move the read/write head assembly to the rear of the diskette drive assembly until it reaches track 0.

Note: The head is moved under power by a stepper motor. When you move the head by hand, you will feel some resistance, but the head should not bind.



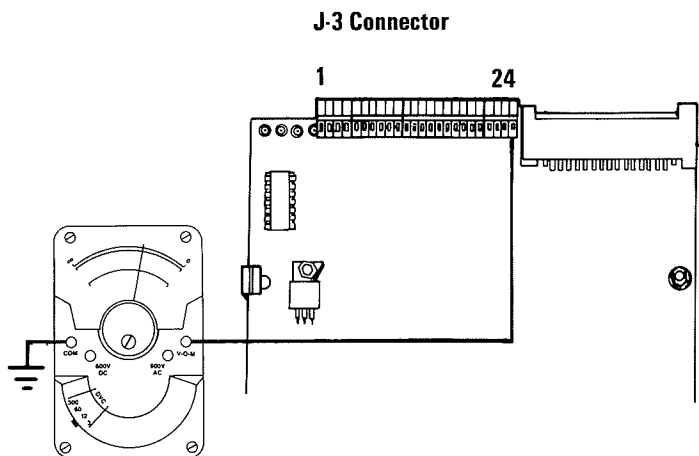
DID THE HEAD MOVE TO TRACK 0 WITH NO BINDS?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES 

1. With the head still at track 0, reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Check the voltage at J3-24. It should be approximately 5.0 Vdc before the LED lights at the end of POST.

Note: The head may move away from track 0 during this test. If you run this test a second time, reposition the head to track 0.

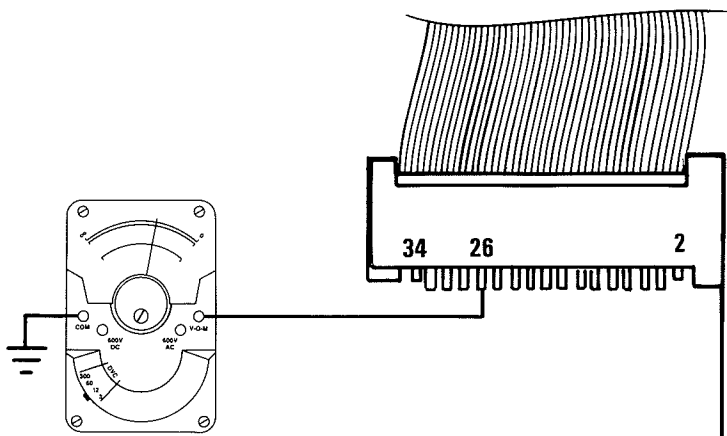


WAS THE VOLTAGE APPROXIMATELY 5.0 Vdc?

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Move the read/write head assembly to the rear of the diskette drive assembly until it reaches track 0.
 4. Reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 5. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 6. The voltage at pin 26 on the signal cable's connector should read approximately 5.0 Vdc at the start of POST.
-

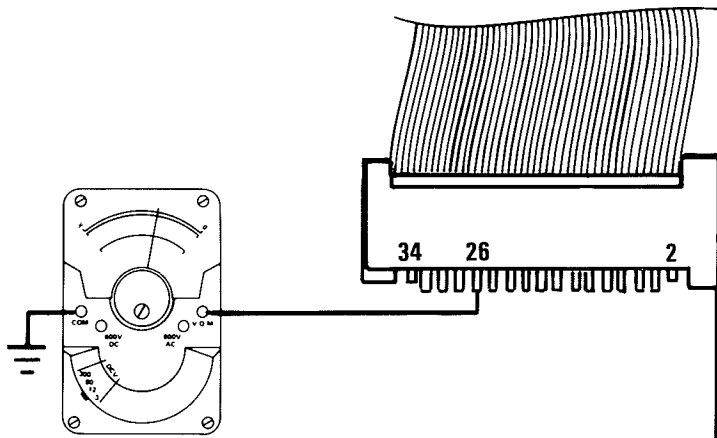


WAS THE VOLTAGE APPROXIMATELY 5.0 Vdc AT THE START OF POST?

NO Go to page 3-600-71.

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Move the read/write head assembly to the rear of the diskette drive assembly until it reaches track 0.
 4. Reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 5. Set the Power switch on the expansion unit (if attached) and system unit to On.
 6. The voltage at pin 26 on the signal cable's connector should read approximately 5.0 Vdc at the start of POST and should decrease to approximately 0 Vdc as the LED lights at the end of POST.
-



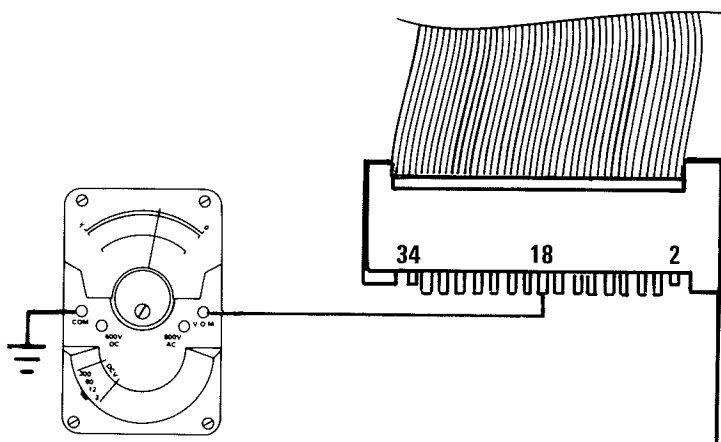
DID THE VOLTAGE DECREASE TO APPROXIMATELY 0 Vdc?

NO Replace the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Ensure the terminating resistor is correctly inserted. It should be installed in the printed circuit board of drive A and should not be in the printed circuit board of drive B. See Section 4, "Locations."
 3. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 4. Check the voltage at pin 18 of the signal cable's connector. The voltage should be approximately 5.0 Vdc at the start of POST and should decrease to approximately 0 Vdc before the "beep" at the end of POST.
-

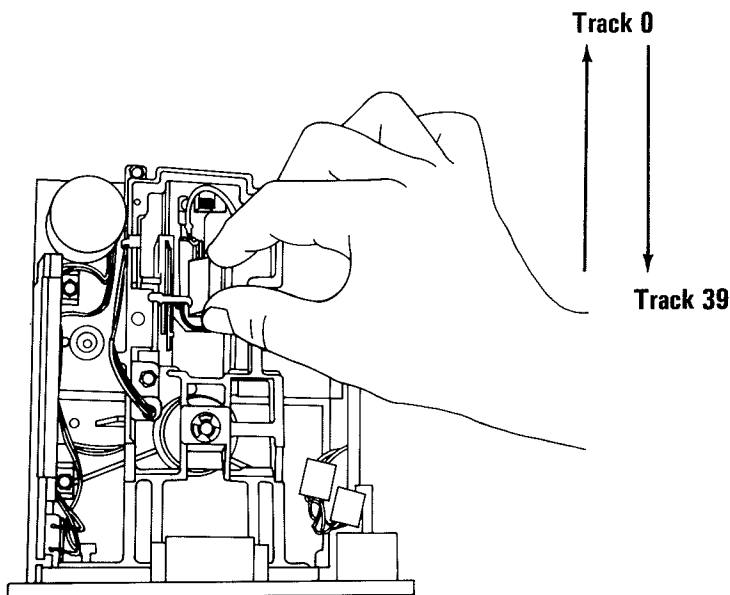


DID THE VOLTAGE AT PIN 18 DECREASE TO APPROXIMATELY 0 Vdc?

NO Go to page 3-600-71.

YES

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Partially remove the diskette drive printed circuit board. Leave all connectors on except HD0 and HD1. See Section 5, "Removal/Replacement and Adjustments."
 3. Lift the diskette drive printed circuit board just enough to observe the head assembly.
 4. Move the head assembly away from track 0.
 5. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 6. Observe the motion of the head assembly.
-

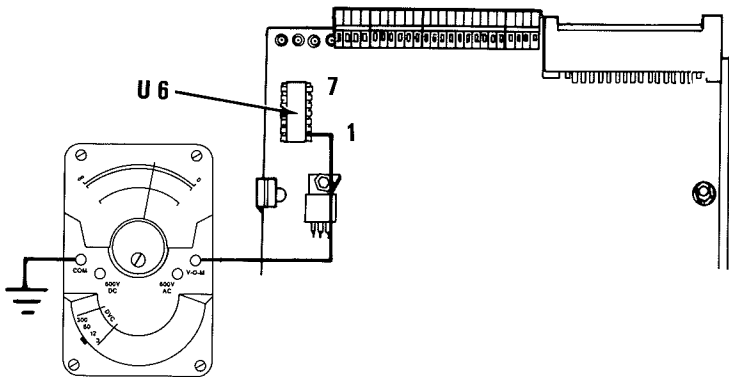


**DOES THE HEAD ASSEMBLY MOVE TO TRACK 0
AND THEN AWAY FROM IT BEFORE THE END
OF THE POST?**

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES 

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Reinstall the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."
 3. Insert your Advanced Diagnostics diskette.
 4. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 5. Check for an increase in voltage (approximately 0.2 Vdc) at U6-pin 1 of the diskette drive printed circuit board while the LED is on during POST.
-

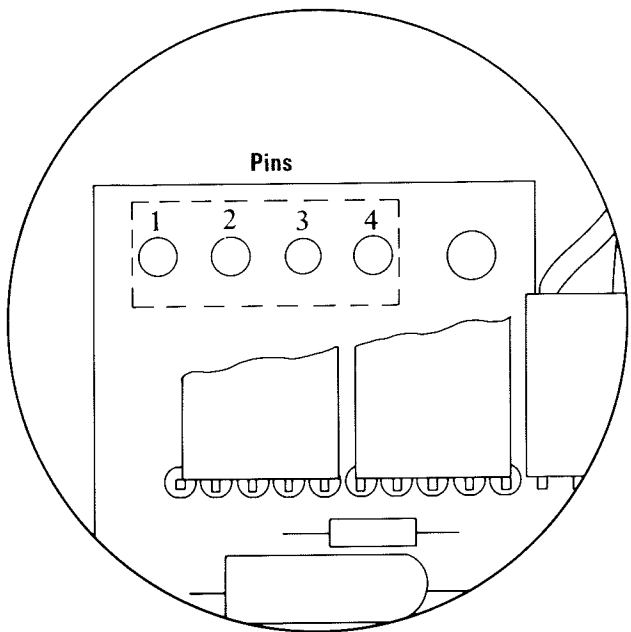


**DOES THE VOLTAGE AT U6-PIN 1 INCREASE
WHEN THE LED IS ON?**

NO Replace the diskette drive assembly. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-600-71.

Check the diskette drive's power connector for the voltages listed in the table below.



Diskette Drive Power Connector			
Min Vdc	Max Vdc	- Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1

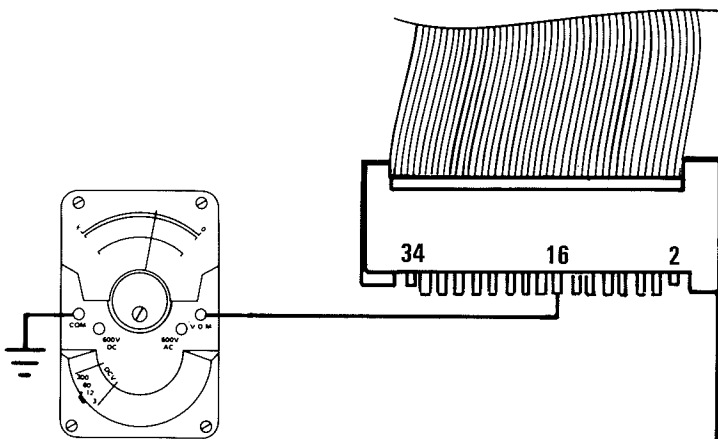
ARE THE VOLTAGES WITHIN THE LIMITS SHOWN IN THE TABLE?

NO Go to PIC 3-020-1, "Power."

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
 2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
 3. Check for the voltage at pin 16 on the signal cable's connector. The voltage should be approximately 5.0 Vdc at the start of POST and should decrease to approximately 0 Vdc before the "beep" at the end of POST.
-

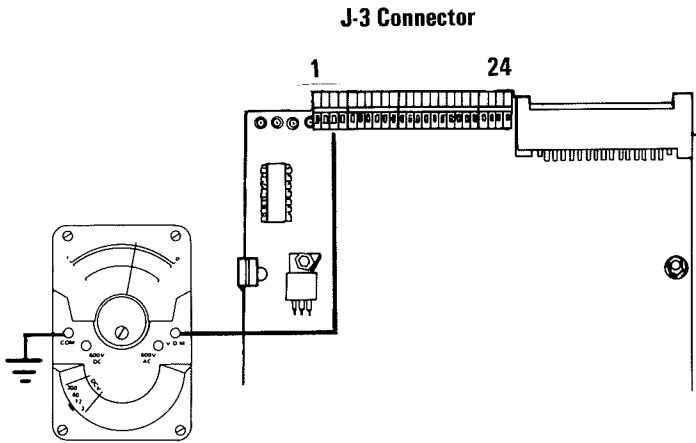


DID THE VOLTAGE AT PIN 16 DECREASE TO APPROXIMATELY 0.Vdc?

NO Go to page 3-600-71.

YES

Check for a voltage of 3 to 9 Vdc at J3-3 when the LED is on.

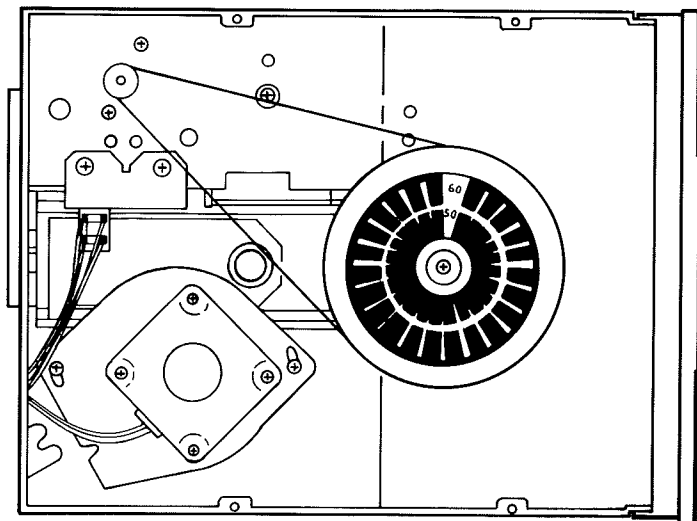


WAS THE VOLTAGE CORRECT?

NO Replace the diskette drive printed circuit board.
See Section 5, "Removal/Replacement and
Adjustments."

YES 

Check the diskette drive belt.



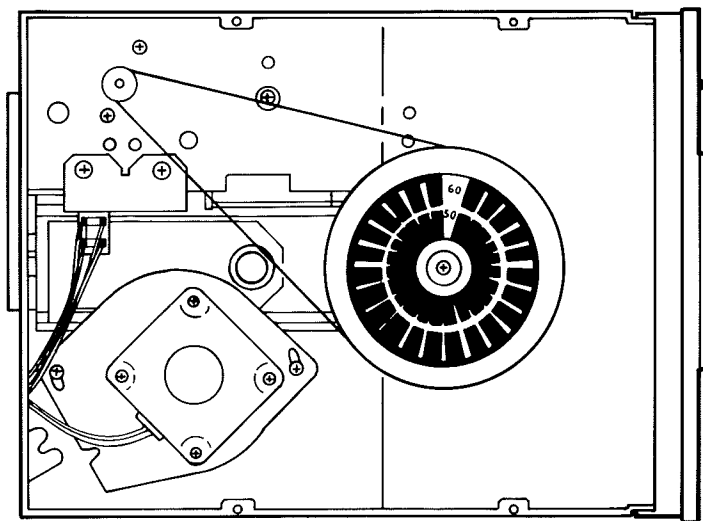
Diskette

IS THE DRIVE BELT INSTALLED ON THE PULLEYS CORRECTLY AND IN GOOD CONDITION?

NO Replace the drive belt. See Section 5, "Removal/Replacement and Adjustments."

YES

Remove the diskette drive belt and turn the spindle to ensure it turns freely and without binds.



DOES THE SPINDLE TURN FREELY?

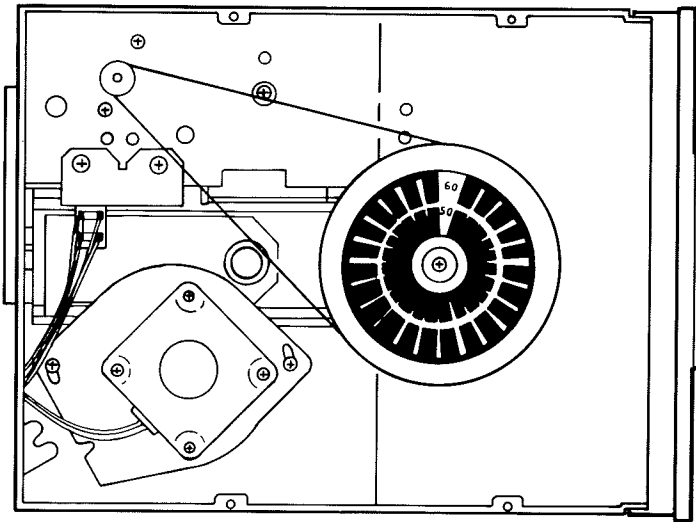
NO Replace the spindle assembly. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the diskette drive motor. See Section 5, "Removal/Replacement and Adjustments."

1. Use the drive motor preliminary speed adjustment to check the diskette drive speed. See Section 5, "Removal/Replacement and Adjustments." Adjust the speed if necessary.

Note: A fluorescent light is needed to see the strobe effect on this test.

2. Refer to steps 1 thru 7 on page 3-600-46 to run diagnostic tests on a formatted diskette. Then return to this page.



Diskette

DO YOU STILL HAVE AN ERROR CODE?

NO Run diagnostic tests to verify you have fixed the problem.

YES Go to page 3-600-68 and follow the instructions for your error code.

Do not use this table, unless you are directed here by an earlier step in this PIC.

Diskette Drive Error Codes

Error Code	Probable Cause	Corrective Action
606	Your signal cable, diskette drive adapter, or diskette drive assembly has failed.	Go to page 3-600-71 and check the continuity of the signal cable. If you still have the same error replace the diskette drive. See Section 5, "Removal/Replacement and Adjustments."
607	Write Protect Error	Go to page-3-600-73.
608	There is a problem with your Advanced Diagnostics diskette.	Use your backup copy of the Advanced Diagnostics diskette.
611	Your signal cable, diskette drive adapter, or diskette drive has failed.	Go to page 3-600-71 and check the continuity of the signal cable. If you have the same error replace the diskette drive. See Section 5, "Removal/Replacement and Adjustments."

Do not use this table, unless you are directed here by an earlier step in this PIC.

Diskette Drive Error Codes

Error Code	Probable Cause	Corrective Action
612	Your signal cable, or diskette drive adapter has failed.	Go to page 3-600-71.
613	Your signal cable or diskette drive adapter has failed.	Go to page-3-600-71.
621 622 623 624 625 626	Your signal cable, diskette drive adapter, or diskette drive has failed.	Go to page 3-600-71 and check the continuity of the signal cable. If you still have the same error replace the diskette drive. See Section 5, "Removal/Replacement and Adjustments."

Insert a scratch diskette in each diskette drive and then press Enter.

The screen will display the configuration of the diskette drive(s) installed in your system. The XXXKB is the type of drive(s).

Note: All type 2 diskette drives are 320KB.



TESTING — 1 DISKETTE DRIVE(S) AND ADAPTER
DISKETTE A: IS A 320KB DRIVE
1 DISKETTE DRIVE(S) AND ADAPTER 600S

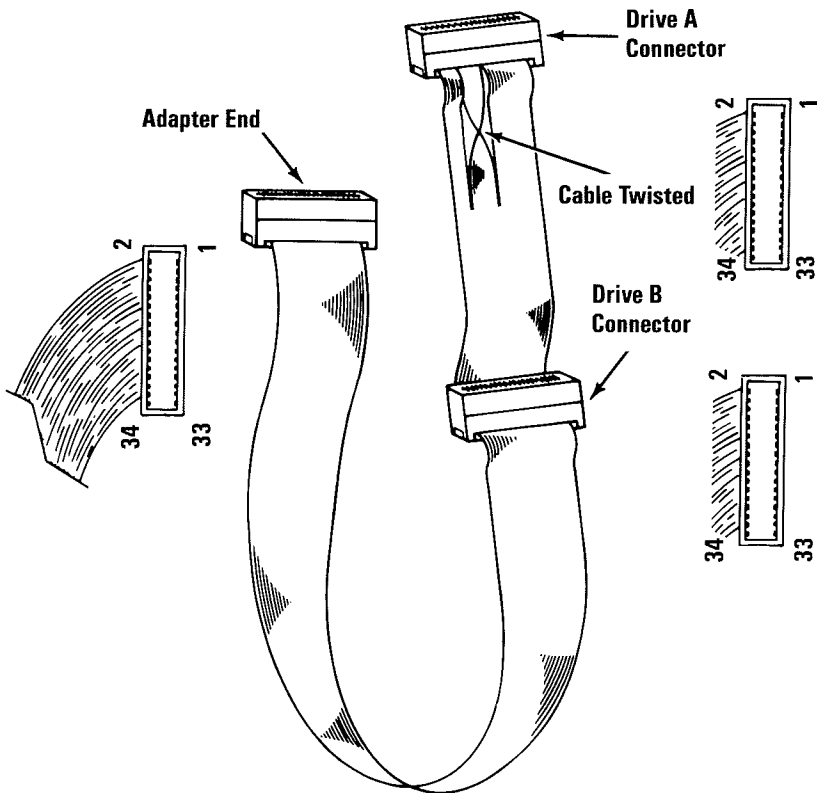
ARE THE DISKETTE DRIVE(S) CORRECT?

NO Replace the diskette drive assembly that is shown incorrectly in the message. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-600-76.

You may have a bad connection or a broken wire. Perform the following continuity check of the diskette drive signal cable.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Disconnect the diskette drive signal cable from the diskette adapter and the diskette drive.
3. Carefully inspect the cable connectors for bent or broken contacts. Inspect the connectors on the adapter and on the diskette drive printed circuit board for cracks or corrosion.
4. Set meter on the Ohms (x1) scale.
5. Refer to the tables on the next page and check the continuity of the signal cable. The meter should indicate approximately 0 ohms resistance.



Note: Check continuity pin number to pin number except the pins preceded by an asterisk.

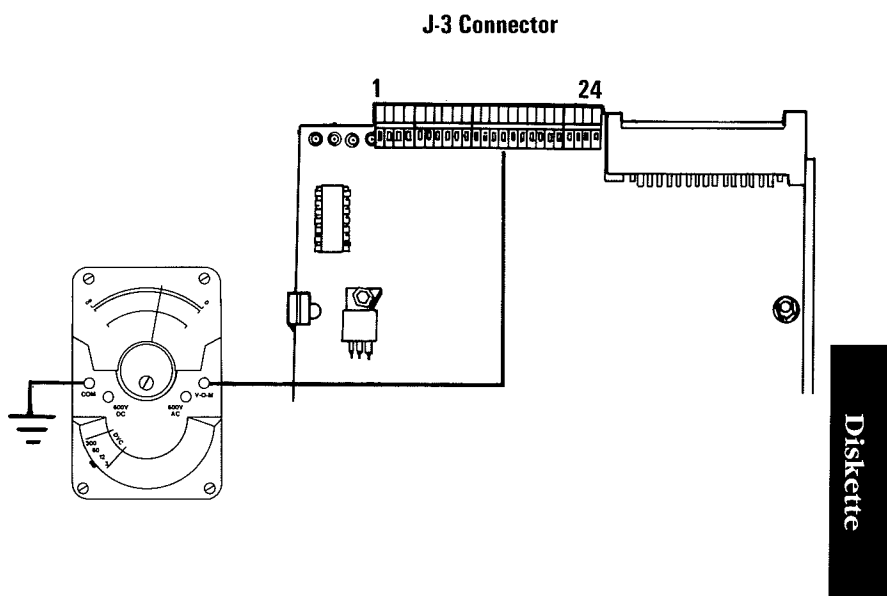
Diskette Drive A Signal-Cable Connector		Diskette Drive B Signal-Cable Connector	
Even Pin Numbering Diskette	Adapter	Even Pin Numbering Diskette	Adapter
2	2	2	2
4	4	4	4
6	6	6	6
8	8	8	8
*10	16	10	10
*12	14	12	12
*14	12	14	14
*16	10	16	16
18	18	18	18
20	20	20	20
22	22	22	22
24	24	24	24
26	26	26	26
28	28	28	28
30	30	30	30
32	32	32	32
34	34	34	34
Odd Pin Numbering Diskette		Odd Pin Numbering Diskette	
Adapter		Adapter	
1	1	1	1
3	3	3	3
5	5	5	5
7	7	7	7
9	9	9	9
*11	15	11	11
13	13	13	13
*15	11	15	15
17	17	17	17
19	19	19	19
21	21	21	21
23	23	23	23
25	25	25	25
27	27	27	27
29	29	29	29
31	31	31	31
33	33	33	33

WAS THE CONTINUITY OF THE SIGNAL CABLE CORRECT?

NO Replace the signal cable. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the diskette drive adapter. See Section 5, "Removal/Replacement and Adjustments."

1. Remove your diskette.
 2. Check the voltage from J3-14 to ground while partially inserting and removing a diskette from the drive. This will operate the write protect switch. The voltage should decrease from approximately 5.0 Vdc to approximately 0 Vdc each time the switch is operated.
-



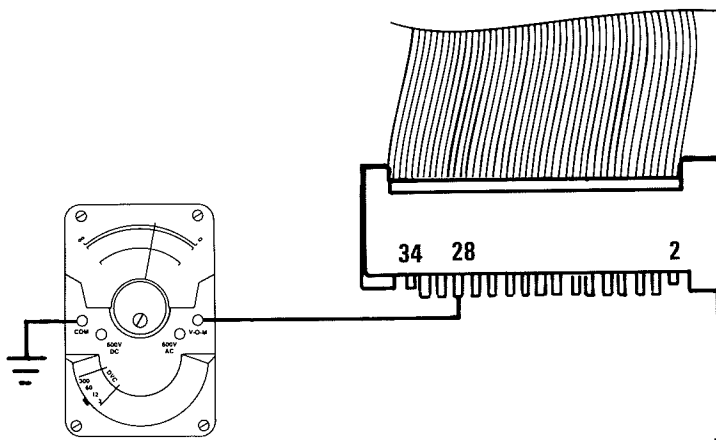
**DID THE VOLTAGE DECREASE FROM
APPROXIMATELY 5.0 Vdc TO APPROXIMATELY
0 Vdc EACH TIME THE SWITCH WAS OPERATED?**

NO Replace the write protect switch. See Section 5,
"Removal/Replacement and Adjustments."

YES



1. Remove your diskette.
 2. Check the voltage at J1-28. The voltage should be approximately 5.0 Vdc.
-



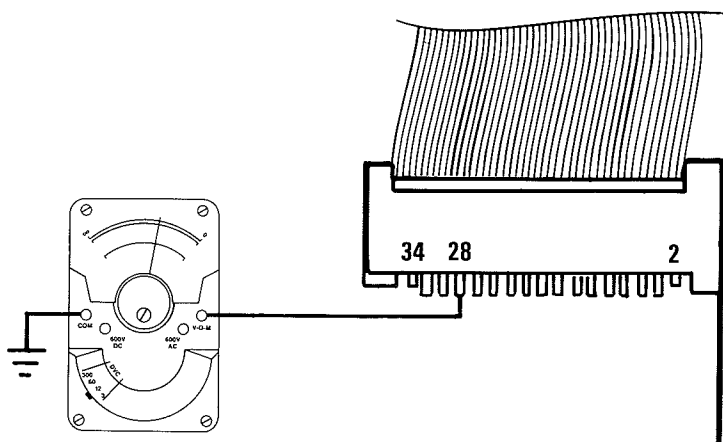
IS THE VOLTAGE APPROXIMATELY 5.0 Vdc?

NO Go to page 3-600-71.

YES



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off for 5 seconds.
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Partially insert and remove a diskette from the diskette drive to operate the write protect switch, and measure the voltage at J1-28 while the LED is lit. The voltage should be approximately 5.0 Vdc and decrease to approximately 0 Vdc each time the write protect switch is operated. To test drive B exchange the signal cable connectors and perform the same steps.



DID THE VOLTAGE CHANGE FROM APPROXIMATELY 5.0 Vdc TO APPROXIMATELY 0 Vdc EACH TIME THE WRITE PROTECT SWITCH WAS OPERATED WHILE THE LED WAS LIT?

NO Replace the diskette drive printed circuit board. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the diskette drive adapter. See Section 5, "Removal/Replacement and Adjustments."

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

Math Coprocessor

You have entered this PIC because you have a 7XX error code or have identified a Math Coprocessor problem. Follow the steps on this page to run the diagnostic routines.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Insert your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit (if attached) and the system unit to On.

The menu below should be displayed.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp, 1981, 1982

SELECT AN OPTION

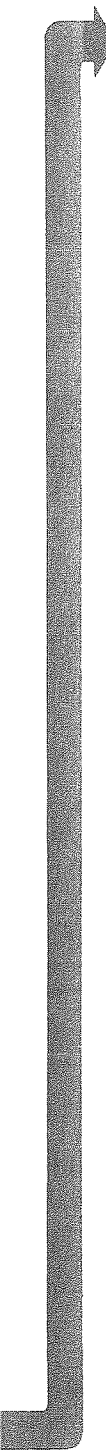
0 – RUN DIAGNOSTIC ROUTINES
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR RELOCATION
9 – EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED
? __

Coprocessor

CONTINUE





Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

(Skip Step 2 if you have only one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is incorrect, follow the instructions on your screen and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Press 7 (MATH COPROCESSOR) then press Enter.

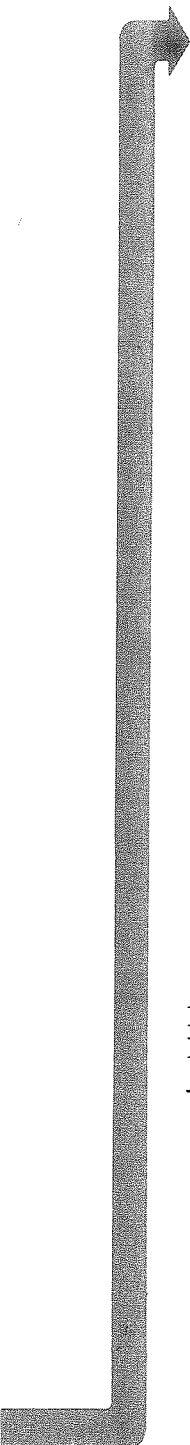
The message on the screen below should appear for ten seconds or less.

TESTING MATH COPROCESSOR

WAS THIS MESSAGE DISPLAYED FOR TEN SECONDS OR LESS?

NO Replace the Math Coprocessor and 8088 processor. See Section 5, "Removal/Replacement and Adjustments."

YES 



You may receive an error message similar to the one below.

ERROR MATH COPROCESSOR 701 S
SWITCH 1 – 2 INCORRECT

PRESS ENTER TO CONTINUE

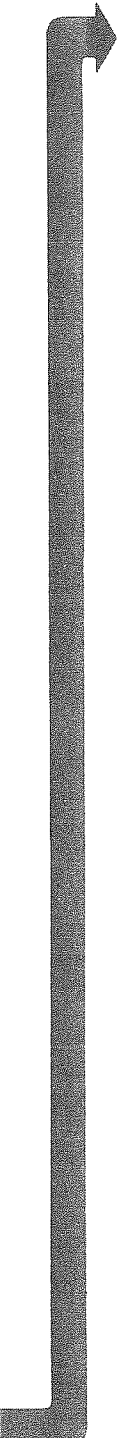
**DID YOU COMPLETE THE TEST WITHOUT THIS
ERROR MESSAGE?**

- NO** Set all Power switches to Off. Set switch block 1, switch 2 to Off (see Section 6, “Switch Settings”) and run the test again. If the switch is in the correct position remove the Math Coprocessor and the 8088 processor from the system board. Replace the system board. See Section 5, “Removal/Replacement and Adjustments.”

YES



Coprocessor




You may receive an error message similar to the one below.

ERROR – MATH COPROCESSOR 701 S

**DID YOU COMPLETE THE TEST WITHOUT THIS
ERROR MESSAGE?**

NO Replace the Math Coprocessor and 8088 processor. See Section 5, "Removal/Replacement and Adjustments."

YES 



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

Notes:


Printer Adapter

You have entered this PIC because you have a 90X error code or have identified a printer adapter problem. Follow the steps on this page to run the diagnostic routines.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
 2. Remove the option cable from the option adapter.
 3. Load the Advanced Diagnostics diskette in drive A.
 4. Set the Power switch on the expansion unit (if attached) and system unit to On.
 5. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
-

CONTINUE





(Skip the next step if you only have one display adapter installed)

1. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
2. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is incorrect, follow the instructions on the display to correct the list before answering yes.)
3. Press 0 (RUN TESTS ONE TIME) then press Enter.
4. Press 9 (PRINTER ADAPTER) then press Enter.

You may receive an error message similar to the one below.

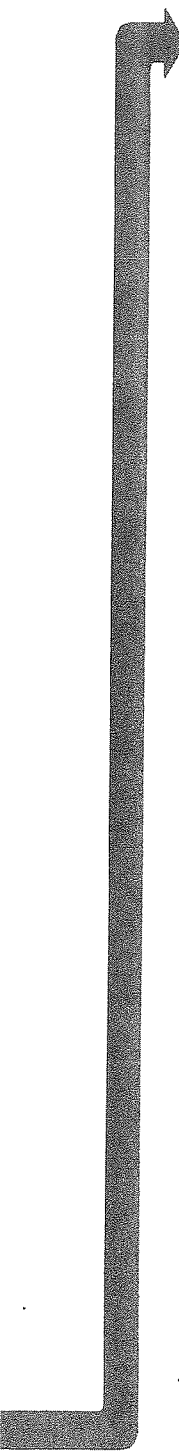
X:XX:XX
ERROR-PRINTER ADAPTER
90X

PRESS ENTER TO CONTINUE — —
— —

DID YOU COMPLETE THE TEST WITHOUT AN ERROR MESSAGE?

NO Replace the printer adapter. See Section 5, "Removal/Replacement and Adjustments."

YES 



If you did not receive an error message, you would have received a message similar to the one below.

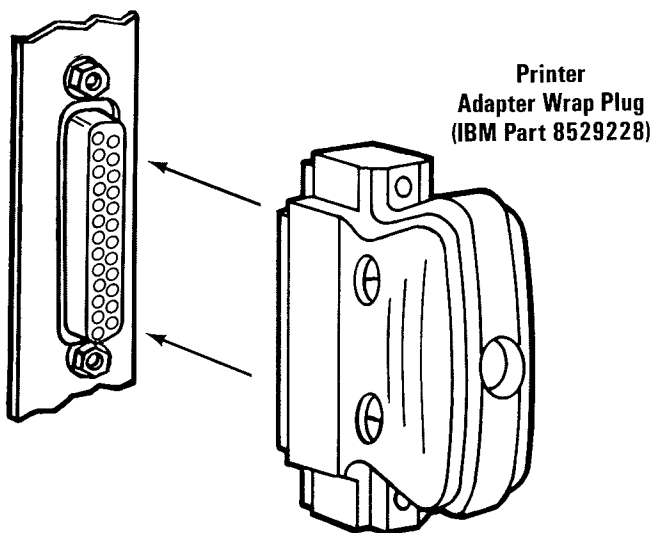
Note: Do not press Enter at this time.

TESTING – PRINTER ADAPTER

INSERT WRAP PLUG AND PRESS "ENTER" – ☼ –

CONTINUE 

Install the printer adapter wrap plug, as shown below. (If you do not install the wrap plug, you will receive an invalid error message.)



CONTINUE

Press Enter to begin the test. An error message similar to the one shown below may appear.

0:06:21

ERROR – PRINTER ADAPTER 901 E

PRESS ENTER TO CONTINUE 

DID YOU RECEIVE AN ERROR MESSAGE?

NO Remove the printer adapter wrap plug. You may want to run additional tests on the printer attached to this adapter. See PIC 3-1400-1, “Printer.”

YES Replace the printer adapter. See Section 5, “Removal/Replacement and Adjustments.”

Notes:

Asynchronous Communications

You have entered this PIC because you have an 11XX error code or have identified a problem with asynchronous communications.

Before running the diagnostic routines, refer to Section 4, "Locations" and ensure that the following conditions are met:

The primary asynchronous communications adapter must be set for "Primary Asynchronous Adapter" operation.

If there is a second asynchronous communications adapter, it must be set for "Alternate Asynchronous Adapter" operation.

All asynchronous communications adapters must be set for RS232-C operation.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Insert your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit (if attached) and the system unit to On.


The screen shown below should be displayed.

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SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

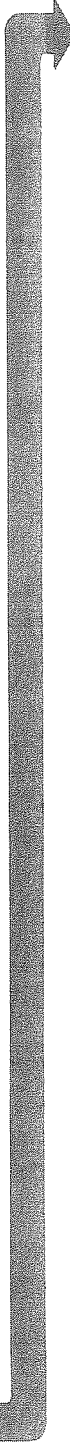
ENTER THE ACTION DESIRED

? -  -

Asynch

CONTINUE





Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES), then press Enter.

(Skip Step 2 if you only have one display adapter installed.)

2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is not correct, follow the instructions on your display and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 11 (ASYNC COMMUNICATIONS ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS CABLE ATTACHED?) then press Enter.

The screen should now say to install the wrap plug on either the async adapter, or on the IBM Communications Cable.

TESTING – ASYNC COMMUNICATIONS ADAPTER

**IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE ASYNC ADAPTER (Y/N) y**

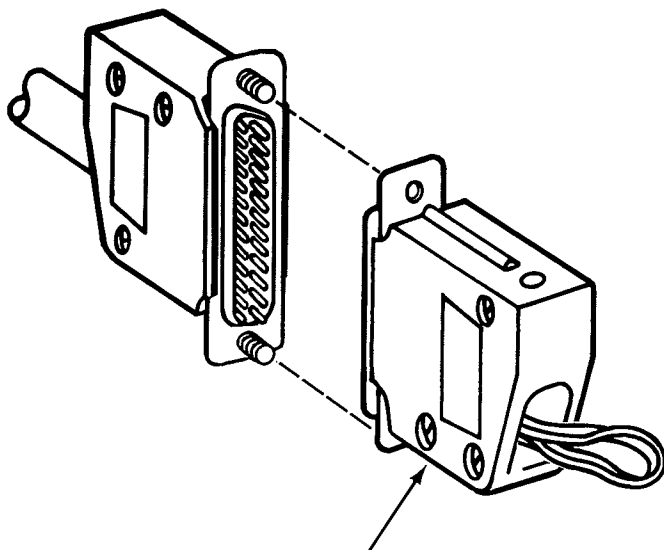
**INSTALL THE WRAP PLUG ON THE END
OF THE CABLE AND PRESS ENTER – **

IS AN IBM COMMUNICATIONS CABLE ATTACHED?

NO Go to page 3-1100-4.

YES 

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
 2. Press Enter to begin the test. The test may take up to 15 seconds.
-



IBM Communications Adapter
Wrap Plug (IBM Part 8529280)

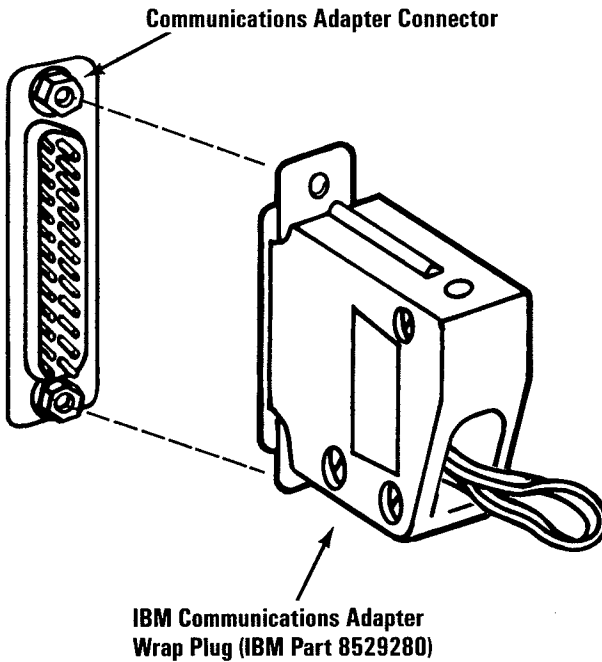
Asynch

**DOES THE MESSAGE ON YOUR DISPLAY
INSTRUCT YOU TO INSTALL THE WRAP PLUG
ON THE ASYNC ADAPTER?**

NO Go to page 3-1100-5.

YES 


1. Remove the communications cable (if attached) from the async adapter.
 2. Refer to the figure below and install the wrap plug on the async adapter.
 3. Press Enter to begin the test. The test may take up to 15 seconds.
-



DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message says to replace the cable, do so. If it says to replace the async adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES 



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.

Notes:

Alternate Asynchronous Communications

You have entered this PIC because you have a 12XX error code or have identified a problem with alternate asynchronous communications.

Before running the diagnostic routines, refer to Section 4, "Locations" and ensure that the following conditions are met:

The primary asynchronous communications adapter must be set for "Primary Asynchronous Adapter" operation. There must be a second asynchronous communications adapter, set for "Alternate Asynchronous Adapter" operation.

Both asynchronous communications adapters must be set for RS232-C operation.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Insert your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit (if attached) and the system unit to On.

The screen shown below should be displayed.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2. XX (C) Copyright IBM Corp 1981, 1982

SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE


ENTER THE ACTION DESIRED

? -  -

Alt. Asynch

CONTINUE





Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
- (Skip Step 2 if you only have one display adapter installed.)
2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is not correct, follow the instructions on your display and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 12 (ALT ASYNC COMMUNICATIONS ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS CABLE ATTACHED?) then press Enter.

The screen should now say to install the wrap plug on either the alternate async adapter, or on the IBM Communications Cable.

TESTING - ALT ASYNC COMMUNICATIONS ADPT

IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE ALT ASYNC ADAPTER (Y/N) y

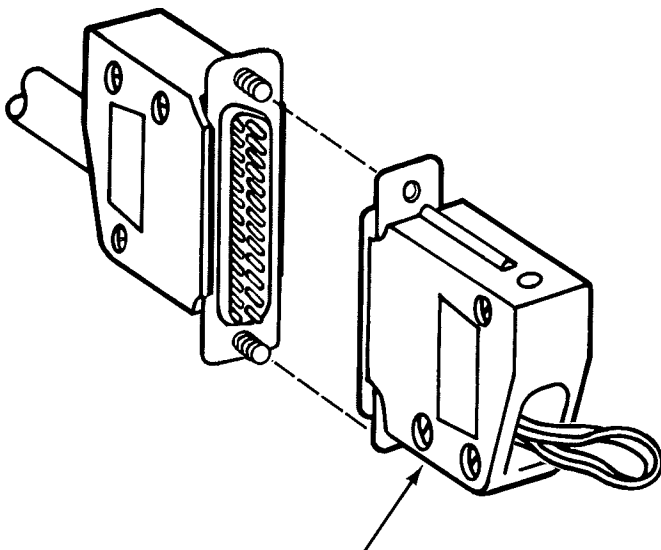
INSTALL THE WRAP PLUG ON THE END
OF THE CABLE AND PRESS ENTER -  -

**IS AN IBM COMMUNICATIONS CABLE
ATTACHED?**

NO Go to page 3-1200-4.

YES 

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
 2. Press Enter to begin the test. The test may take up to 15 seconds.
-



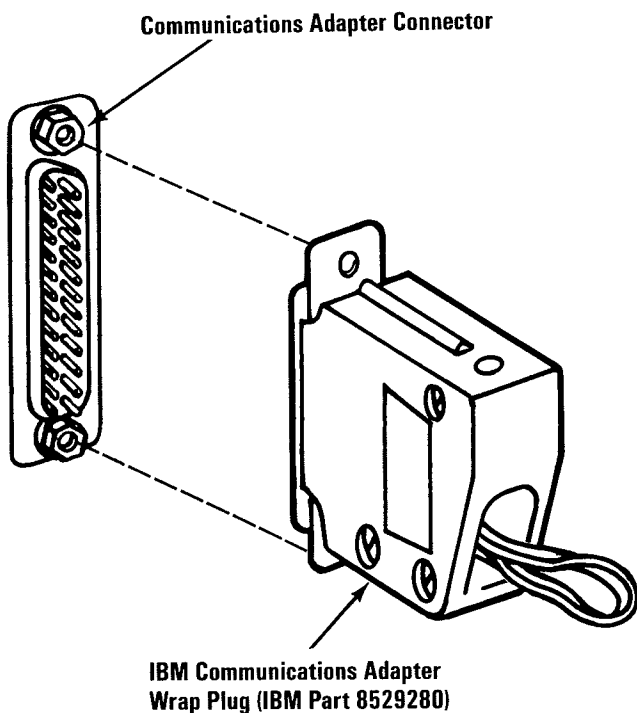
IBM Communications Adapter
Wrap Plug (IBM Part 8529280)

**DOES THE MESSAGE ON YOUR DISPLAY
INSTRUCT YOU TO INSTALL THE WRAP PLUG
ON THE ALTERNATE ASYNCH ADAPTER?**

NO Go to page 3-1200-5.

YES

1. Remove the communications cable (if attached) from the alternate async adapter.
 2. Refer to the figure below and install the wrap plug on the alternate async adapter.
 3. Press Enter to begin the test. The test may take up to 15 seconds.
-

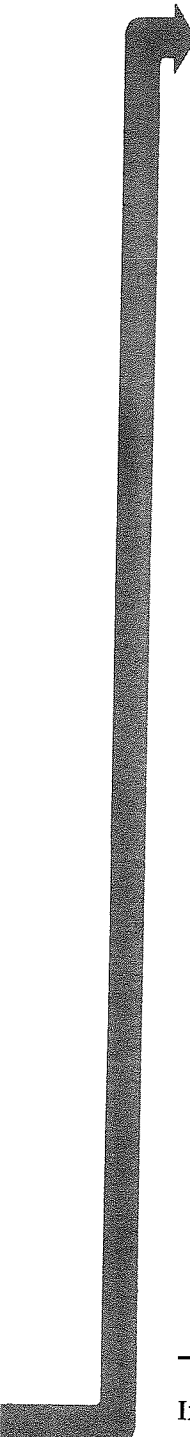


DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message says to replace the cable, do so. If it says to replace the alternate async adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES





You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start!"
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

Alt. Asynch

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.


Notes:

Game Control Adapter

You have entered this PIC because you suspect a game control adapter problem or you have an error indicating a game control adapter problem.

1. If you have not already done so, load your Advanced Diagnostics diskette.
2. Press 0 and Enter (RUN DIAGNOSTIC ROUTINES).
3. Verify the installed devices and follow the instructions on the screen to add the game control adapter to the list if it is missing.
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 13 (GAME CONTROL ADAPTER) then press Enter.

The following message will appear on your display.

TESTING - GAME CONTROL ADAPTER
DO YOU HAVE JOY STICKS, PADDLES,
OR NOTHING ATTACHED (J P N)? -  -

ARE THE JOY STICKS OR PADDLES INSTALLED?

NO Connect the joy sticks or paddles and go to page 3-1300-2.

YES 

3-1300-1

-

[illegible]

BUTTON D
 RELEASED

```

* * * * *
*
*
*
* B
*
*
* * * * *

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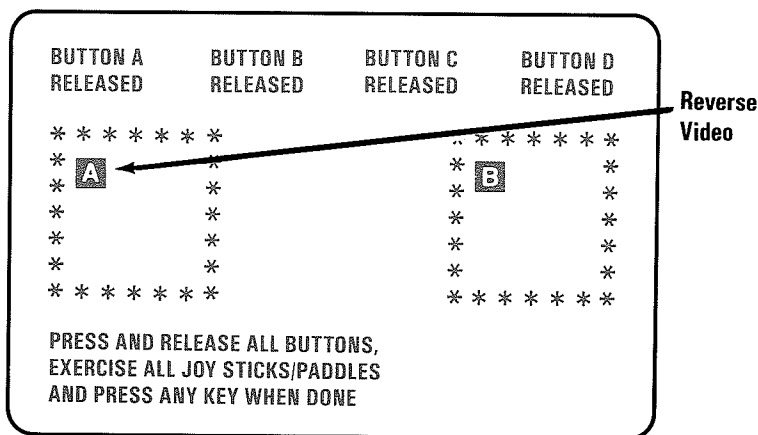
**PRESS AND RELEASE ALL BUTTONS,
EXERCISE ALL JOY STICKS/PADDLES
AND PRESS ANY KEY WHEN DONE**

NO Replace the game control adapter.



Check the joy sticks next. If one or all of the joy sticks/paddles appear on the screen in reverse video you should check the connector before continuing.

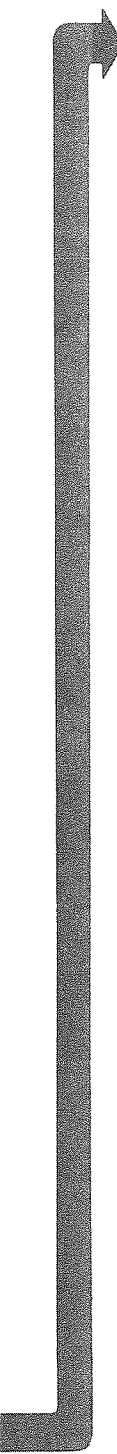
1. Move the paddles/joy sticks in all directions on all the installed joy sticks/paddles.
2. Watch to see that the letter inside the box on the display moves in all directions without going into reverse video.

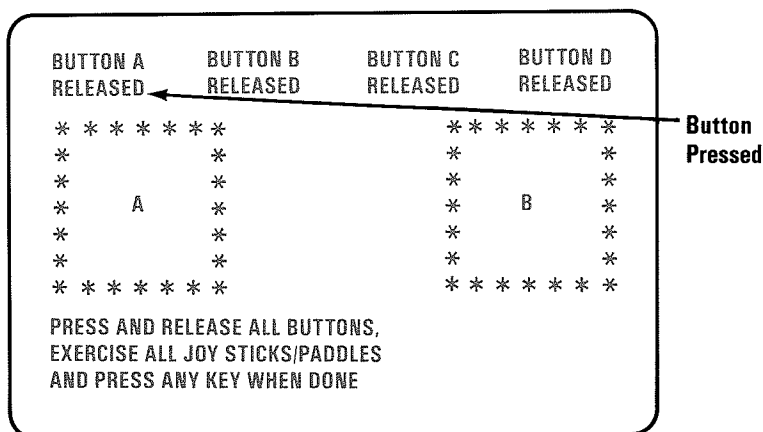


DID ALL JOY STICKS/PADDLES MOVE IN ALL DIRECTIONS WITHOUT GOING INTO REVERSE VIDEO?

NO If the joy sticks/paddles move but go into reverse at the boundary of the box, replace joy sticks. If one joy stick/paddle does not move and stays in reverse video, replace joy sticks. If one or all joy sticks/paddles stay in reverse video but can move, replace game control adapter. See Section 5, "Removal Replacement and Adjustments."

YES

- 
1. Press and release all buttons on the joy sticks/paddles. All the buttons must be pressed or an error code will occur.
When a button is pressed the corresponding prompt on the display transfers from RELEASED to PRESSED.
 2. After pressing all buttons on the joy sticks/paddles, press any key on the keyboard.
-



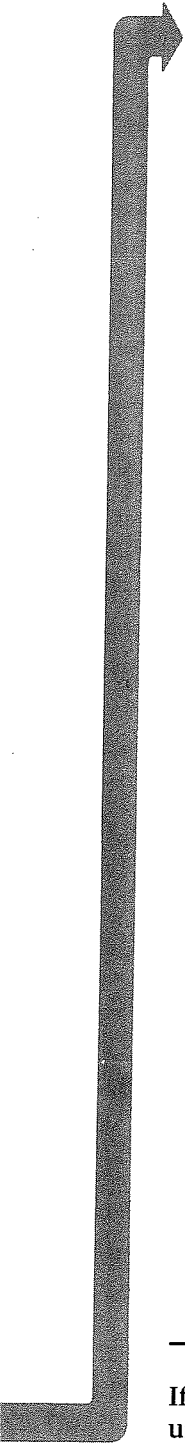
DID THE TEST COMPLETE WITHOUT AN ERROR CODE?

NO If all buttons showed PRESSED when tested, replace game control. See Section 5, "Removal Replacement and Adjustments."

If one or all of the buttons did not show PRESSED when tested, replace joy stick/paddles.

YES





You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.

Notes:

Error Description	Diagnostic Action
1400 Printer Entry	<ol style="list-style-type: none"> Set Printer Power switch to OFF. Verify forms are properly inserted. Move print head to left-most position. Set Printer Power switch to ON. Are the Power, Ready and Online lights on? YES: Go to step 2. NO: Go to page 3-1400-27, "Control Panel," and follow each step until failing FRU is isolated. Press Online switch. Does Online light go out? YES: Go to step 3. NO: Go to page 3-1400-27, "Control Panel." Press Line Feed and Forms Feed. Do forms step when each switch is pressed? YES: Go to step 4. NO: Do forms step when either the Line Feed or the Forms Feed is pressed? YES: Go to page 3-1400-27, "Control Panel." NO: Go to page 3-1400-16, "Forms Do Not Advance," and follow each step until failing FRU is isolated. Remove forms. Press Online switch. Does alarm sound and No Paper light go on? YES: Power Off. Reload forms. Power On. Go to step 5. NO: Go to page 3-1400-27, "Control Panel."

Error Description	Diagnostic Action
1400 Printer Entry	<p>5. Load Advanced Diagnostics diskette if not already loaded.</p> <p>Is option 14 missing from menu?</p> <p>YES: Go to step 6.</p> <p>NO: Run option 14.</p> <p>Does the printer fail to print?</p> <p>YES: Go to step 6.</p> <p>NO: Compare printout with this one.</p> <p>IBM 80 CPS Matrix Printer</p> <p>! " # \$ % & ' () * + , - . /</p> <p>0 1 2 3 4 5 6 7 8 9 : ; < = > ?</p> <p>@ A B C D E F G H I J K L M N O</p> <p>P Q R S T U V W X Y Z [\] ^ _</p> <p>' a b c d e f g h i j k l m n o</p> <p>p q r s t u v w x y z { } ~</p> <p>! " # \$ % & ' () * + , - . /</p> <p>0 1 2 3 4 5 6 7 8 9 : ; < = > ?</p> <p>@ A B C D E F G H I J K L M N O</p> <p>P Q R S T U V W X Y Z [\] ^ _</p> <p>' a b c d e f g h i j k l m n o</p> <p>p q r s t u v w x y z { } ~</p> <p>! " # \$ % & ' () * + , - . /</p> <p>' a b c d e f g h i j k l m n o</p> <p>Continued on the next page.</p>

Error Description	Diagnostic Action
1400 Printer Entry	<p>6. Power off the printer and the system unit. Disconnect the signal cable at the printer and the system unit. Run the Offline Diagnostic Test (see page 3-1400-35).</p> <p>Does the printer fail to print?</p> <p>YES: Go to page 3-1400-12, "No Printing," and follow each step until the failing FRU is isolated.</p> <p>NO: Compare the printout with the one below.</p> <p>IBM 80 CPS Matrix Printer</p> <pre> mnopqrstuvwxyz_ abc_ _klmnopqrstuvwxyz{ }~ abcdefghijklmnopqrstuvwxyz{ }~ abcdefghijklmnopqrstuvwxyz{ }~ abcdefghijklmnopqrstuvwxyz{ }~ efghijklmnopqrstuvwxyz{ }~ ghijklmnopqr_ _yz{ }~ </pre> <p>IBM 80 CPS Graphics Printer</p> <pre> rstuvwxyz{ }~ai. efghijklmnopqrstuvwxyz{ }~aióú efghijklmnopqrstuvwxyz{ }~aióúñ ghijklmnopqrstuvwxyz{ }~aióúññ hijklmnopqrstuvwxyz{ }~aióúñññ ijklmnopqrstuvwxyz{ }~aióúññññ mnopqr_ _ññññññ </pre> <p>Any errors?</p> <p>YES: Go to page 3-1400-6, "Failure Symptom" chart. Proceed to the corresponding page and follow each step in PIC procedure until the failing FRU is isolated.</p> <p>NO: Go to step 7.</p>

Error Description	Diagnostic Action
1400 Printer Entry	<p>7. Load the Advanced Diagnostics diskette and set the Power switch on the expansion unit (if attached) and the system unit to On. Advance to diagnostic menu 4.</p> <p>Note: If the signal cable was connected to a monochrome display, and printer adapter, option 4 should be displayed. If the cable was connected to a printer adapter, option 9 should be displayed.</p> <p>Is the correct option (4 or 9) missing?</p> <p>YES: Replace the adapter. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Run the diagnostic routines for the option adapter installed.</p> <p>Did the diagnostics run error free?</p> <p>YES: Go to step 8.</p> <p>NO: Replace the adapter. See Section 5, "Removal/Replacement and Adjustments."</p> <p>8. Check the printer cable. See Section 4, "Locations." Check all pins, pin to pin, on the cable for shorts or opens.</p> <p>Any shorts or opens?</p> <p>YES: Replace printer cable.</p> <p>NO: Replace control cards in printer. See Section 5, "Removal/Replacement and Adjustments."</p>

Failure Symptom	Page
Power Supply	3-1400-7
Print Head	
No Printing	3-1400-12
Print head carriage not moving	3-1400-15
Forms	
Forms not advancing; overprinting	3-1400-16
Forms jamming or tearing	3-1400-16
Ribbon	
Ribbon jammed	3-1400-18
Print Quality	
Printing too light; poor print quality	3-1400-19
Smudged printing	3-1400-20
Uneven printing (characters or lines)	3-1400-20
Row(s) of print dots missing	3-1400-21
Random print dots missing	3-1400-22
Extra print dots	3-1400-23
Printing continues beyond end-of-forms	3-1400-24
Doublespacing — abnormal characters	3-1400-24
False end-of-forms alarm	3-1400-25
Uneven horizontal spacing	3-1400-26
Control Panel	3-1400-27

Error Description	Diagnostic Action
Power Supply Check	<p>1. Set printer power switch to OFF. Unplug printer power cord. Position Printer power switch to ON. Measure 2 to 12 ohms between voltage terminals on power cord.</p> <p>Does the resistance = 2 to 12 ohms?</p> <p>YES: Go to step 3.</p> <p>NO: Check for open fuse. See Section 4, "Locations."</p> <p>Is the fuse open?</p> <p>YES: Replace fuse. See Section 5, "Removal/Replacement and Adjustments." Power off. Plug in printer power cord. Power on for 1 minute.</p> <p>Does the fuse open?</p> <p>YES: Go to step 2.</p> <p>NO: Problem resolved.</p> <p>NO: Check for approximately 12 ohms on primary side of power transformer. See Section 4, "Locations."</p> <p>Does the resistance = 12 ohms?</p> <p>DANGER: Static voltage may be present on the fuse-filter card. Use extreme caution in this area.</p> <p>YES: Replace fuse-filter card. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace power transformer. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Power Supply Check	<p>2. Set printer Power switch to OFF. Unplug printer cord. Replace fuse. See Section 5, "Removal/Replacement and Adjustments." Disconnect power transformer connector from fuse-filter card. See Section 4, "Locations." Plug in printer power cord. Power on for 1 minute then power off. Unplug printer power cord and check for open fuse.</p> <p>Is the fuse open?</p> <p>DANGER: Static voltage may be present on the fuse-filter card. Use extreme caution.</p> <p>YES: Replace Fuse-Filter card. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace power transformer. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action																									
Power Supply Check	<p>3. Disconnect CN2. See Section 4, "Locations." Plug in printer power cord. Set printer Power switch to ON. Measure voltages on the plug side of CN2 according to the chart below.</p> <p>DANGER: Line voltage is present on the AC filter, circuit board and transformer. Caution should be exercised when measuring secondary voltages.</p> <table><tr><th>Color</th><th>+ Lead</th><th>- Lead</th><th>Min. Voltage</th><th>Max. Voltage</th></tr><tr><td>Gray</td><td>CN2-1</td><td>CN2-2</td><td>7.6 Vac</td><td>10.4 Vac</td></tr><tr><td>Orange</td><td>CN2-3</td><td>CN2-4</td><td>19.5 Vac</td><td>26.5 Vac</td></tr><tr><td>Red</td><td>CN2-5</td><td>CN2-6</td><td>8.1 Vac</td><td>10.9 Vac</td></tr><tr><td>Blue</td><td>CN2-7</td><td>CN2-8</td><td>13.0 Vac</td><td>17.6 Vac</td></tr></table> <p>Are the voltages in range?</p> <p>YES: Go to step 4.</p> <p>NO: Replace power transformer. See Section 5, "Removal/Replacement and Adjustments."</p>	Color	+ Lead	- Lead	Min. Voltage	Max. Voltage	Gray	CN2-1	CN2-2	7.6 Vac	10.4 Vac	Orange	CN2-3	CN2-4	19.5 Vac	26.5 Vac	Red	CN2-5	CN2-6	8.1 Vac	10.9 Vac	Blue	CN2-7	CN2-8	13.0 Vac	17.6 Vac
Color	+ Lead	- Lead	Min. Voltage	Max. Voltage																						
Gray	CN2-1	CN2-2	7.6 Vac	10.4 Vac																						
Orange	CN2-3	CN2-4	19.5 Vac	26.5 Vac																						
Red	CN2-5	CN2-6	8.1 Vac	10.9 Vac																						
Blue	CN2-7	CN2-8	13.0 Vac	17.6 Vac																						

Error Description	Diagnostic Action									
Power Supply Check	<p>4. Set the printer Power switch to OFF. Connect CN2. See Section 4, "Locations." Power ON then measure voltages at CN3 (see Section 4, "Locations") as shown in the chart below. Use the ground pin on the drive circuit card.</p> <p>DANGER: Line voltage is present on the AC filter, circuit board and transformer. Caution should be exercised when measuring DC voltages.</p> <table><tr><th>Pin No.</th><th>Min. Voltage</th><th>Max. Voltage</th></tr><tr><td>CN3-16</td><td>4.5 Vdc</td><td>5.5 Vdc</td></tr><tr><td>CN3-20</td><td>11.0 Vdc</td><td>15.4 Vdc</td></tr></table> <p>Are + 5 and + 14 Vdc within range?</p> <p>YES: Go to step 5.</p> <p>NO: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p>	Pin No.	Min. Voltage	Max. Voltage	CN3-16	4.5 Vdc	5.5 Vdc	CN3-20	11.0 Vdc	15.4 Vdc
Pin No.	Min. Voltage	Max. Voltage								
CN3-16	4.5 Vdc	5.5 Vdc								
CN3-20	11.0 Vdc	15.4 Vdc								

Error Description	Diagnostic Action						
Power Supply Check	5. Measure the + 24 Vdc (use ground pin on the driver circuit card).						
	<table><tr><th>Pin No.</th><th>Min. Voltage</th><th>Max. Voltage</th></tr><tr><td>CN3-18</td><td>21.6 Vdc</td><td>26.4 Vdc</td></tr></table>	Pin No.	Min. Voltage	Max. Voltage	CN3-18	21.6 Vdc	26.4 Vdc
	Pin No.	Min. Voltage	Max. Voltage				
	CN3-18	21.6 Vdc	26.4 Vdc				
	Is + 24 Vdc within range?						
YES: Power supply checks good. NO: Go to step 6.							
6. Measure DC voltages (on 60-volt scale) on pins CN6-1 and CN6-2 located on control circuit card (use the DC ground pin on the driver circuit card for common lead). Find the difference in the two readings.							
Is the difference 0.5 to 0.9 Vdc?							
YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."							
NO: Replace the heat sink/power transistor assembly. See Section 5, "Removal/Replacement and Adjustments."							

Error Description	Diagnostic Action
NO Printing	<ol style="list-style-type: none"> 1. Does print head carriage move back and forth normally when attempting to print? YES: Go to page 3-1400-21, "Row(s) of print dots missing." NO: Go to step 2. 2. Check for a loose or broken carriage belt. Replace if broken, adjust if loose. See Section 5, "Removal/Replacement and Adjustments." 3. Remove ribbon cartridge. Turn knob on cartridge to check for jamming. Replace if jammed. See Section 5, "Removal/Replacement and Adjustments." 4. Check print head for broken wires. Replace print head if wires are damaged. See Section 5, "Removal/Replacement and Adjustments." 5. Set printer Power switch to OFF. Move print head assembly and check for smooth mechanical operation. Is there smooth operation? YES: Go to step 6. NO: Check for worn or broken gears in Carriage Drive assembly. Are any gears worn or broken? YES: Replace carriage drive assembly. See Section 5, "Removal/Replacement and Adjustments." NO: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
No Printing	<p>6. Set the printer Power switch to ON. Move the print head to the left-most position. Check for an Up level (approximately + 5 Vdc) to a Down level (approximately 0 Vdc) meter deflection at CN6-20 on the driver circuit card (see Section 4, "Locations") while moving the print head to the center of the print line. Use the ground pin on the driver circuit card for common.</p> <p>Is there an Up level to a Down level meter deflection?</p> <p>YES: Go to step 7.</p> <p>NO: Is there a constant Down level?</p> <p>YES: Go to page 3-1400-7, "Power Supply Check." Replace the left margin sensor if the power supply checks good. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Set the printer Power switch OFF. Check continuity from CN6-20 (driver circuit card) to left margin sensor terminal 1 and from CN6-15 to left margin sensor terminal 2. See Section 4, "Locations."</p> <p>Is either line open?</p> <p>YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace left margin sensor. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
No Printing	<p>7. Check for a meter deflection from an Up level (approximately + 5 Vdc) to a Down level (approximately 0 Vdc) on pin CN6-19 on the driver circuit card (see Section 4, "Locations,") while applying slight left or right pressure to the print head without advancing the print head to the next detented position. Use the driver circuit card ground pin for common.</p> <p>Is there an Up level to a Down level meter deflection?</p> <p>YES: Go to step 8.</p> <p>NO: Is there a constant Up level?</p> <p>YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Check for + 5 Vdc at CN5-18. See Section 4, "Locations."</p> <p>Is there + 5 Vdc?</p> <p>YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Go to page 3-1400-7 "Power Supply Check."</p>

Error Description	Diagnostic Action
No Printing	<p>8. Set printer Power switch to OFF. Measure resistance between pin CN6-13, (driver circuit card), and pins CN6-21, 22, 23 and 24 (stepper motor coils) on cable end for a reading of approximately 45 ohms.</p> <p>Does the resistance = 45 ohms?</p> <p>YES: Replace control cards. See Section 5, "Removal/Replacement and Adjustments"</p> <p>NO: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p>
Print Head Carriage Not Moving	<p>1. Go to page 3-1400-12, "No Printing."</p>

Error Description	Diagnostic Action
<p>Forms Do Not Advance</p> <p>Overprinting</p> <p>Forms Jamming or Tearing</p>	<ol style="list-style-type: none"> 1. Check position of forms feeding into printer. Forms path must be parallel to printer sides. Reposition forms for parallel feeding. 2. Check forms path for any obstructions (for example, jagged edges on forms box, torn paper in print mechanism). Remove any obstructions. 3. Inspect left and right forms tractors. <ul style="list-style-type: none"> — Poor positioning — Loose covers — Loose lock levers — Worn springs — Broken feed pins <p>Replace left or right forms tractors if damaged. See Section 5, "Removal/Replacement and Adjustments."</p> 4. Check for a loose or broken carriage belt. Check for broken cogs on the belt. Adjust if loose or replace if broken. See Section 5, "Removal/Replacement and Adjustments." 5. Inspect print head for broken wires. Replace if wires damaged. See Section 5, "Removal/Replacement and Adjustments." 6. Check print head gap adjustment. Adjust if out of tolerance. See Section 5, "Removal/Replacement and Adjustments." 7. Check for bent or pitted ribbon shield. Replace shield if damaged. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
<p>Forms Do Not Advance</p> <p>Overprinting</p> <p>Forms Jamming or Tearing</p>	<p>8. Check for damaged platen. Replace print mechanism assembly if platen is damaged. See Section 5, "Removal/Replacement and Adjustments."</p> <p>9. Set printer Power switch to OFF. Advance forms by turning forms advance knob. Check intermediate gear for worn or broken teeth and replace gears if damaged. Check left and right tractors for broken feedpins and replace if broken. See Section 5, "Removal/Replacement and Adjustments."</p> <p>10. Check for 45 ohms resistance on forms feed motor coils between pin CN6-14 and pins CN6-25, 26, 27 and 28 on driver circuit card. See Section 4, "Locations."</p> <p>Does the resistance = 45 ohms?</p> <p>YES: Check for + 24 Vdc at CN3-18. See Section 4, "Locations."</p> <p>Is there + 24 Vdc?</p> <p>YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: See page 3-1400-7, "Power Supply Check."</p> <p>NO: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Ribbon Jammed	<ol style="list-style-type: none"> 1. Remove ribbon cartridge. Try a print operation to verify that print head carriage functions normally. If carriage fails, see page 3-1400-12, "No Printing." 2. Check ribbon cartridge for binding by manually advancing ribbon and replace if binding. 3. Visually check for worn or broken ribbon drive gears and replace carriage drive assembly if damaged. See Section 5, "Removal/Replacement and Adjustments." 4. Check for bent ribbon shield and replace if necessary. See Section 5, "Removal/Replacement and Adjustments." 5. Check print head for broken or binding wires. Replace print head if wires are broken or bound. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
<p>Printing Too Light</p> <p>Poor Print Quality</p>	<ol style="list-style-type: none"> 1. Check for adequate ink on ribbon or damaged ribbon and replace cartridge if needed. 2. Check ribbon cartridge for binding by manually advancing ribbon and replace if binding. 3. Visually check for worn or broken ribbon drive gears and replace carriage drive assembly if damaged. See Section 5, "Removal/Replacement and Adjustments." 4. Check for bent ribbon shield and replace if necessary. See Section 5, "Removal/Replacement and Adjustments." 5. Check print head for broken or binding wires. Replace print head if wires are broken or bound. See Section 5, "Removal/Replacement and Adjustments." 6. Verify that print head gap is 0.6 to 0.65 mm (.024 to .026") with the lever in the center position. See Section 5, "Removal/Replacement and Adjustments." 7. Check print head for loose mounting. See Section 5, "Removal/Replacement and Adjustments." 8. Check for loose or damaged platen, print head carriage shafts, or print mechanism frame. Replace print mechanism if needed. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
Smudged Printing	<ol style="list-style-type: none"> 1. Check ribbon cartridge for <ul style="list-style-type: none"> — Jammed — Seated improperly — Excessive ink — Oily or dirty 2. Check for dirty, oily, or damaged platen. Replace print mechanism if platen is damaged. See Section 5, "Removal/Replacement and Adjustments." 3. Check for dirty print head and print wires. Clean if dirty. 4. Check for dirty or bent ribbon shield and replace shield if damaged. See Section 5, "Removal/Replacement and Adjustments." 5. Visually check for worn or broken ribbon drive gears and replace carriage drive assembly if damaged. See Section 5, "Removal/Replacement and Adjustments."
Uneven Printing Top/bottom of character Left/right of print line	<ol style="list-style-type: none"> 1. No adjustment can be made, replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
Row(s) of Print Dots Missing	<ol style="list-style-type: none"> 1. Check ribbon for damage (folds, holes, tears). Replace cartridge if damaged. 2. Verify print head gap adjustment is between 0.6 to 0.65 mm (.024 to .026") at center position of adjusting lever. See Section 5, "Removal/Replacement and Adjustments." 3. Check for damaged platen. Replace print mechanism if platen is damaged. See Section 5, "Removal/Replacement and Adjustments." 4. Check print head for broken wires. If wires are broken, replace print head. See Section 5, "Removal/Replacement and Adjustments." 5. Remove CN6 on driver circuit card. See Section 4, "Locations." Measure approximately 22 ohms between pin CN6-10 (male side) and each head coil pin (CN6-1 to 9 [male side]). Does the resistance = 22 ohms? YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments." NO: Disconnect print head cable and check pins 1 through 9 on print head cable for approximately 22 ohms in respect to common. See Section 4, "Locations." Does the resistance = 22 ohms? YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments." NO: Replace print head. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
Random Print Dots Missing	<ol style="list-style-type: none"> 1. Check ribbon for damage (folds, holes, tears). Replace cartridge if damaged. 2. Verify print head gap adjustment is between 0.6 to 0.65 mm (.024 to .026") at center position of adjusting lever. See Section 5, "Removal/Replacement and Adjustments." 3. Check for damaged platen. Replace print mechanism if platen is damaged. See Section 5, "Removal/Replacement and Adjustments." 4. Check print head for broken wires. If wires are broken, replace print head. See Section 5, "Removal/Replacement and Adjustments." 5. Remove CN6 on driver circuit card. See Section 4, "Locations." Measure approximately 22 ohms between pin CN6-10 (male side) and each head coil pin (CN6-1 to 9 [male side]). Does the resistance = 22 ohms? YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments." NO: Disconnect print head cable and check pins 1 through 9 on print head cable for approximately 22 ohms in respect to common. See Section 4, "Locations." Does the resistance = 22 ohms? YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments." NO: Replace print head. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
Extra Print Dots	<ol style="list-style-type: none"> <li data-bbox="348 142 916 224">1. Run "Offline Diagnostic Test" (see page 3-1400-35). Examine the / and Y — characters for extra dots. <li data-bbox="348 240 926 873">2. Remove CN6 on driver circuit card. See Section 4, "Locations." Measure approximately 22 ohms between pin CN6-10 (male side) and each head coil pin (CN6-1 to 9 [male side]). Does the resistance = 22 ohms? YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments." NO: Disconnect print head cable and check pins 1 through 9 on print head cable for approximately 22 ohms in respect to common. See Section 4, "Locations." Does the resistance = 22 ohms? YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments." NO: Replace print head. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action
Extra Print Dots	<p>1. Measure resistance between pins CN6-1 to 9 (see Section 4, "Locations") with respect to every other pin.</p> <p>Are any pins shorted together?</p> <p>NO: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>YES: Disconnect print head cable and recheck pins CN6-1 to 9 with respect to every other pin.</p> <p>Are any pins shorted together?</p> <p>YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace print head. See Section 5, "Removal/Replacement and Adjustments."</p>
Printing Continues Beyond End-of-Forms	<p>1. Set printer Power switch to OFF. Check continuity of end-of-forms switch from pin CN6-18 on driver circuit card (see Section 4, "Locations") to the ground pin on driver circuit card (open when forms inserted and shorted when forms removed).</p> <p>Replace print mechanism assembly if switch fails. See Section 5, "Removal/Replacement and Adjustments."</p> <p>2. Check for + 5 Vdc at CN6-18 on driver circuit card (see Section 4, "Locations") with forms inserted. Check power supply if 0 Vdc. Use ground pin on the driver card.</p>
Doublespacing or Abnormal Characters	<p>1. Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
False End-of-Forms Alarm	<ol style="list-style-type: none"> 1. Is the no paper light off? <ul style="list-style-type: none"> YES: Go to step 2. NO: Are forms inserted properly? <ul style="list-style-type: none"> YES: Go to page 3-1400-24, "Printing Continues Beyond End-of-Forms". NO: Insert forms properly. 2. Power printer off, then Power back on. <ul style="list-style-type: none"> Is the alarm still sounding? <ul style="list-style-type: none"> YES: Measure for +10.5 to 12.5 Vdc on pin 1 of control panel. See Section 4, "Locations". <ul style="list-style-type: none"> Is there +12 Vdc? <ul style="list-style-type: none"> YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments". NO: Replace Control Panel. See Section 5, "Removal/Replacement and Adjustments". NO: Run Offline Diagnostic Test. See page 3-1400-35. <ul style="list-style-type: none"> Does alarm sound? <ul style="list-style-type: none"> YES: Replace print mechanism. See Section 5, "Removal/Replacement and Adjustments". NO: Go to page 3-1400-1, "Printer Entry," if printer failure is still suspected.

Error Description	Diagnostic Action
Uneven Horizontal Spacing	<ol style="list-style-type: none"> 1. Check for a loose print head carriage belt, and adjust belt tension if needed. See Section 5, "Removal/Replacement and Adjustments." 2. Check for a loosely mounted print head. See Section 5, "Removal/Replacement and Adjustments." 3. Check for worn gears in carriage drive assembly, and replace assembly if needed. See Section 5, "Removal/Replacement and Adjustments." 4. Check for bent or binding carriage shafts, and replace print mechanism assembly if needed. See Section 5, "Removal/Replacement and Adjustments."

Error Description	Diagnostic Action												
Control Panel	<div>1. Set printer Power switch to ON. Measure voltages at CN3 as shown in the chart below. Use ground on the Driver Circuit card.</div> <table><tr><th>Pin No.</th><th>Min. Voltage</th><th>Max. Voltage</th></tr><tr><td>CN-3-16</td><td>4.5 Vdc</td><td>5.5 Vdc</td></tr><tr><td>CN3-20</td><td>11.0 Vdc</td><td>15.4 Vdc</td></tr><tr><td>CN3-18</td><td>21.6 Vdc</td><td>26.4 Vdc</td></tr></table> <div>Are all voltages correct?</div> <div>YES: Go to step 2.</div> <div>NO: Go to page 3-1400-7, "Power Supply Check."</div> <div>2. Power off the printer. Disconnect the printer cable at the printer. Insert forms and power on.</div> <div>Are the Power, Ready, and Online lights on?</div> <div>YES: Go to step 6.</div> <div>NO: Is the alarm sounding and the no paper light on?</div> <div>YES: Go to page 3-1400-25, "False End-of-Forms Alarm."</div> <div>NO: Go to step 3.</div>	Pin No.	Min. Voltage	Max. Voltage	CN-3-16	4.5 Vdc	5.5 Vdc	CN3-20	11.0 Vdc	15.4 Vdc	CN3-18	21.6 Vdc	26.4 Vdc
Pin No.	Min. Voltage	Max. Voltage											
CN-3-16	4.5 Vdc	5.5 Vdc											
CN3-20	11.0 Vdc	15.4 Vdc											
CN3-18	21.6 Vdc	26.4 Vdc											

Error Description	Diagnostic Action
Control Panel	<p>3. Is the power light on?</p> <p>YES: Go to step 4.</p> <p>NO: Measure for approximately +10 Vdc to +12 Vdc at pin 9 on the control panel. Use pin 8 for ground. See Section 4, "Locations."</p> <p>Is there +12 Vdc?</p> <p>YES: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Go to page 3-1400-7, "Power Supply Check."</p> <p>4. Is the online light on?</p> <p>YES: Go to step 5.</p> <p>NO: Measure for approximately +10 to +12 Vdc at pin 1 on control panel. Use ground pin on driver circuit card. See Section 4, "Locations."</p> <p>Is there +12 Vdc?</p> <p>YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Control Panel	<p>5. Is the ready light on?</p> <p>YES: Go to step 6.</p> <p>NO: Measure for approximately +10 to +12 Vdc at pin 4 on the control panel. Use ground pin on the driver circuit card. See Section 4, "Locations."</p> <p>Is there +12 Vdc?</p> <p>YES: Replace control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Control Panel	<p>6. Set the printer Power switch to OFF. Insert forms under end-of-forms switch. Set the printer Power switch to ON. Press the online switch.</p> <p>Is the online light off?</p> <p>YES: Go to step 7.</p> <p>NO: Measure for approximately +4 to +5.5 Vdc on pin 5 of control panel. Use pin 8 for ground. See Section 4, "Locations."</p> <p>Is there +5 Vdc?</p> <p>NO: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>YES: Press and hold online switch. Measure 0 to +1.5 Vdc on pin 5 of control panel.</p> <p>Is there +1.5 Vdc?</p> <p>YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Control Panel	<p>7. Press the line feed switch.</p> <p>Do forms step?</p> <p>YES: Go to step 8.</p> <p>NO: Measure for approximately +4 to +5.5 Vdc on pin 7 of control panel. Use pin 8 for ground. See Section 4, "Locations."</p> <p>Is there +5 Vdc?</p> <p>NO: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>YES: Press and hold line feed switch. Measure 0 to +1.5 Vdc on pin 7 of control panel.</p> <p>Is there +1.5 Vdc?</p> <p>YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Control Panel	<p>8. Press the forms feed switch.</p> <p>Do forms advance?</p> <p>YES: Go to step 9.</p> <p>NO: Measure for approximately +4 to +5.5 Vdc on pin 6 of control panel. Use pin 8 for ground. See Section 4, "Locations."</p> <p>Is there +5 Vdc?</p> <p>NO: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>YES: Press and hold form feed switch. Measure 0 to +1.5 Vdc on pin 6 of control panel.</p> <p>Is there +1.5 Vdc?</p> <p>YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Control Panel	<p>9. Remove forms from printer. Press the online switch.</p> <p>Does the alarm sound?</p> <p>YES: Go to step 10.</p> <p>NO: Measure for approximately + 5 Vdc from pin CN6-18 on driver circuit card to ground pin on driver circuit card.</p> <p>Is there + 5 Vdc?</p> <p>YES: Replace print mechanism assembly. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Measure for a voltage pulsing from 0 to +12 Vdc at pin 10 of control panel. Use pin 8 for ground. See Section 4, "Locations." Power off and back on before taking voltage reading. It will only pulse eight times.</p> <p>Does voltage pulse 0 to +12 Vdc?</p> <p>YES: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control cards. See Section 5, "Removal/Replacement and Adjustments."</p>

Error Description	Diagnostic Action
Control Panel	<p>10. Does the No Paper light go on?</p> <p>YES: Control panel checks good. Return to page 3-1400-1, "Printer Entry."</p> <p>NO: Measure for approximately +10 to +12 Vdc at pin 3 of control panel.</p> <p>Is there +12 Vdc?</p> <p>YES: Replace both control cards. See Section 5, "Removal/Replacement and Adjustments."</p> <p>NO: Replace control panel. See Section 5, "Removal/Replacement and Adjustments."</p>

Notes:

Synchronous Data Link Control (SDLC) Communications Adapter

You have entered this PIC because you have an 15XX error code or have identified a Synchronous Data Link Control (SDLC) communications failure.

1. Set the Power switch on the system unit (and expansion unit if attached) to Off.
2. Insert your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion (if attached) and the system unit to On.

The screen shown below should be displayed.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION

- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? -  -

CONTINUE



Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
- (Skip Step 2 if you only have one display adapter installed.)
2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
 3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is not correct, follow the instructions on your display and correct the list before answering yes.)
 4. Press 0 (RUN TESTS ONE TIME) then press Enter.
 5. Select 15 (SDLC COMMUNICATIONS ADAPTER) then press Enter.
 6. Press Y or N (IS AN IBM COMMUNICATIONS CABLE ATTACHED?) then press Enter.

The screen should now say to install the wrap plug on either the SDLC adapter, or on the IBM Communications Cable.

TESTING – SDLC COMMUNICATIONS ADAPTER

**IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE SDLC ADAPTER? (Y/N) y**

**DISCONNECT THE CABLE AT THE MODEM AND
INSTALL THE WRAP PLUG ON THE END OF
THE CABLE.**

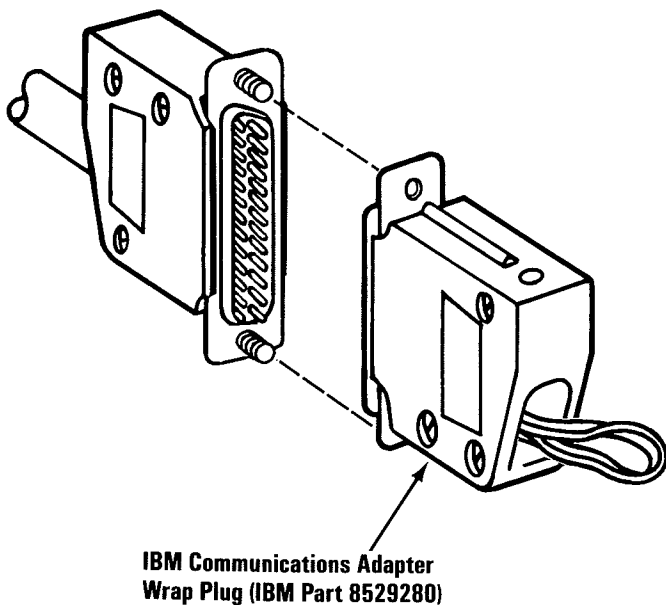
PRESS ENTER WHEN READY —  —

IS AN IBM COMMUNICATIONS CABLE ATTACHED?

NO Go to page 3-1500-4.

YES 

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
 2. Press Enter to begin the test. The test may take up to 15 seconds.
-

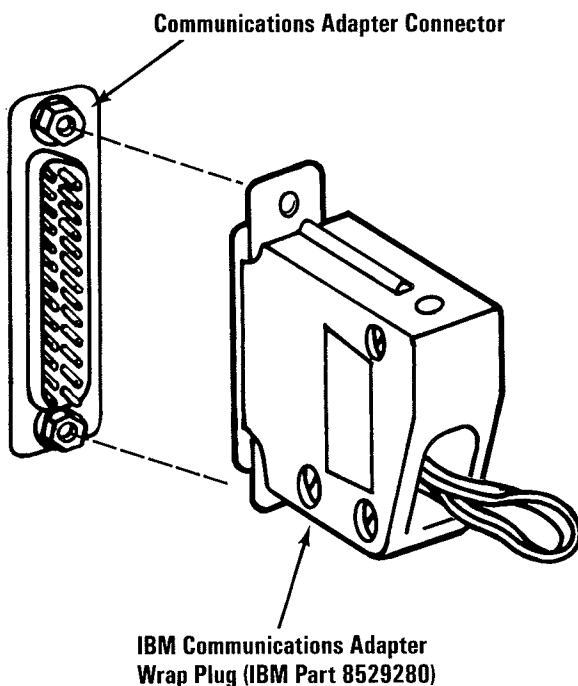


**DOES THE MESSAGE ON YOUR DISPLAY
INSTRUCT YOU TO INSTALL THE WRAP PLUG
ON THE SDLC ADAPTER?**

NO Go to page 3-1500-5.

YES 


1. Remove the communications cable (if attached) from the SDLC adapter.
 2. Refer to the figure below and install the wrap plug on the SDLC adapter.
 3. Press Enter to begin the test. The test may take up to 15 seconds.
-



DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message says to replace the cable, do so. If it says to replace the SDLC adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES |



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.

Notes:

Fixed Disk Drive

You have entered this PIC because you have a 17XX error code or have identified a fixed disk drive problem.

WARNING: Normal shipping and handling can result in permanent loss of all data and formatting on the fixed disk drive(s). It is recommended that all files be backed up onto diskettes.

1. Set the Power switch on the system unit and expansion unit to Off.
2. Load your Advanced Diagnostics diskette in drive A.
3. Set the Power switch on the expansion unit and system unit to On.
4. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES).
5. Verify the installed devices. If any devices are missing from the installed devices list, follow the instructions on the display to add the missing options.
6. When the SYSTEM CHECKOUT Menu is displayed, select 0 (RUN TESTS ONE TIME).

The following screen is displayed:

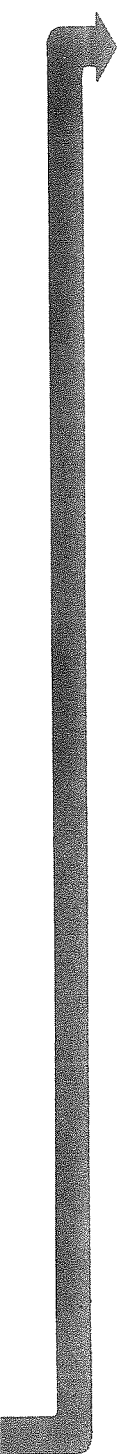
1 - SYSTEM BOARD
18 - S EXPANSION OPTION
2 - S 128KB MEMORY
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
17 - E 2 FIXED DISK DRIVE(S) & ADAPTER
14 - S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS



CONTINUE



- 
1. Select 17 (FIXED DISK DRIVE AND ADAPTER) and then press Enter.

The fixed disk drive adapter is then tested, if the test completes without an error the following is displayed.

TESTING – X FIXED DISK DRIVE(S) & ADAPTER

- 0 – RUN FIXED DISK TEST
- 1 – RUN MEASUREMENTS TEST
- 2 – FORMAT FIXED DISK
- 9 – EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ? – ✱ –

**WAS THE ABOVE MESSAGE DISPLAYED
WITHOUT AN ERROR?**

NO Replace the fixed disk drive adapter. See Section 5, “Removal/Replacements and Adjustments.”

YES 

If your system only has one fixed disk drive, go to page 3-1700-4.

1. Set the Power switch on the system unit and expansion unit to Off.
2. Disconnect the data connector J3 and control connector J1 from fixed disk drive D (see Section 4, "Locations").
3. Load your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit and system unit to On.
5. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES).
6. Verify the installed devices. If any devices are missing from the installed devices list, follow the instructions on the display to add the missing options.
7. Press 0 (RUN TESTS ONE TIME) then press Enter.
8. Select 17 (FIXED DISK DRIVE AND ADAPTER) and then press Enter.

The following screen is displayed:


TESTING - X FIXED DISK DRIVE(S) & ADAPTER

- 0 - RUN FIXED DISK TEST
- 1 - RUN MEASUREMENTS TEST
- 2 - FORMAT FIXED DISK
- 9 - EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ? - ☼ -

Fixed Disk

CONTINUE

- 
1. Press 0 (RUN FIXED DISK TEST) and then press Enter.
 2. When "ENTER DRIVE ID (C/D)" is displayed, press C (for drive C) then press Enter.
 3. When "DO YOU WANT TO PERFORM FIXED DISK WRITE TESTS ON DRIVE C: (Y/N)" is displayed, press Y (yes) or N (no) and then Enter.

The following message should be displayed:

PERFORMING SEEK TEST
PERFORMING WRITE TEST
PERFORMING TRACK ZERO TEST
PERFORMING SURFACE SCAN
PLEASE STAND BY

0 - RUN FIXED DISK TEST
1 - RUN MEASUREMENTS TEST
2 - FORMAT FIXED DISK
9 - EXIT FIXED DISK TESTS

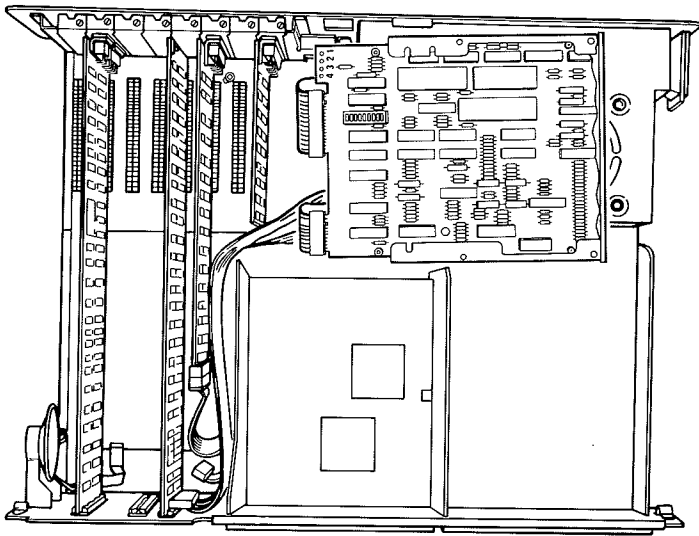
ENTER THE ACTION DESIRED ? - ☼ -

DID THE TEST COMPLETE WITHOUT AN ERROR?

NO If the error prompt is "REPLACE DRIVE C", go to page 3-1700-11 and format drive C. If the error prompt is "CHECK DRIVE C: AND ADAPTER", go to the next page.

YES Go to page 3-1700-11 and format drive D.


1. Set the Power switch on the system unit and expansion unit to Off.
 2. Remove fixed disk drive C from the expansion unit. See Section 5, "Removal/Replacement and Adjustments."
 3. Set the fixed disk drive on the power supply cover so that the logic board faces up and the face plate faces the right side of the unit as shown below.
 4. Reconnect control connector J1, data connector J2, and the power connector.
-



Fixed Disk

CONTINUE



- 
1. Load your Advanced Diagnostics diskette in drive A.
 2. Set the Power switch on the expansion unit and system unit to On.
 3. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
 4. Verify the installed devices. If the fixed disk drive is missing from the installed devices list, follow the instructions on the display to add option 17 (fixed disk drive).
 5. When the SYSTEM CHECKOUT Menu is displayed, press 0 (RUN TESTS ONE TIME) then Enter.

The following screen is displayed:

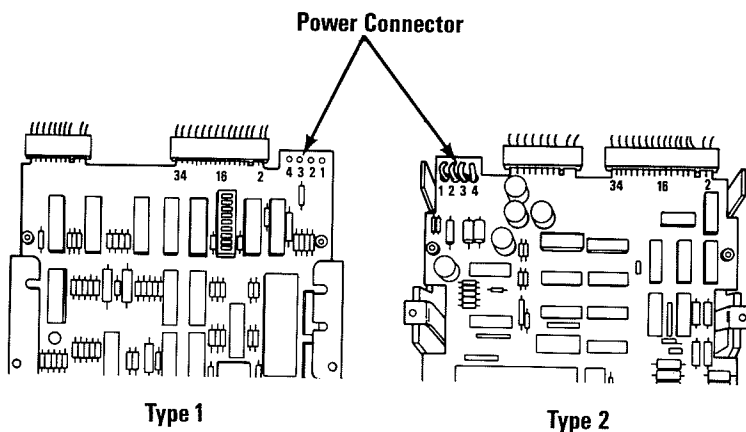
1 - S SYSTEM BOARD
18 - S EXPANSION OPTION
2 - S 128KB MEMORY
3 - S KEYBOARD
4 - S MONOCHROME & PRINTER ADAPTER
6 - S 1 DISKETTE DRIVE(S) AND ADAPTER
9 - S PRINTER ADAPTER
11 - S ASYNC COMMUNICATIONS ADAPTER
17 - E 2 FIXED DISK DRIVE(S) & ADAPTER
14 - S MATRIX PRINTER

ENTER THE NUMBER(S) OF OPTIONS TO TEST
OR PRESS ENTER TO SELECT ALL OPTIONS - ☀ -

CONTINUE 

1. Select 17 (FIXED DISK DRIVE AND ADAPTER) and then press Enter.
2. Press 1 (RUN MEASUREMENTS TEST) then press Enter.
3. When "ENTER DRIVE ID (C/D)?" is displayed, press C then press Enter.
4. Measurement Test 1 is now running. Take the voltage readings at the power connector lands indicated below. Do not press any keys on the keyboard until you are instructed to do so by the PIC.

Fixed Disk Drive Power Connector			
Min Vdc	Max Vdc	-Lead	+ Lead
+ 4.8	+ 5.2	2	4
+ 11.5	+ 12.6	3	1



Fixed Disk

ARE THE VOLTAGES CORRECT?

NO Go to PIC 3-020-1, "Power."

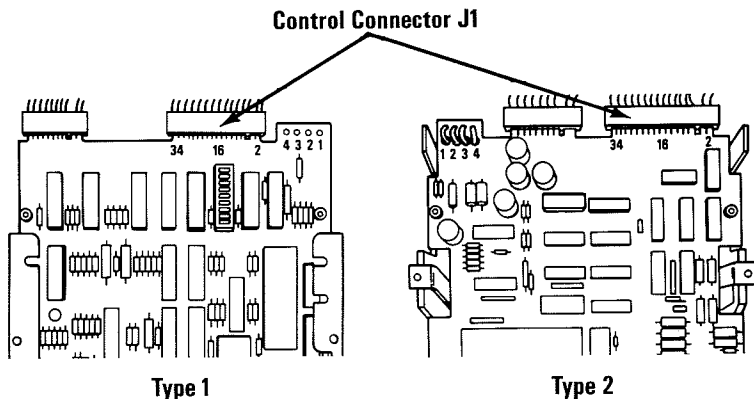
YES

With Measurement Test 1 still running, measure the voltages for a high or low reading as indicated in tables A and B.

Note: A High reading is 2.5 Vdc to 3.0 Vdc. A Low reading is .1 Vdc to .5 Vdc.

Table A		
Connector	Pin	Voltage
J1	2	Low
J1	4	Low
J1	14	Low
J1	18	Low
J1	26	Low

Table B		
Connector	Pin	Voltage
J1	8	Low
J1	10	Low
J1	12	High
J1	22	Low



ARE THE VOLTAGES IN TABLES A AND B CORRECT?

NO If any of the voltages in Table A are incorrect, check the fixed disk cable then replace the fixed disk adapter.
If any of the voltages in Table B are incorrect, go to page 3-1700-11 and format drive C.
If both tables have incorrect voltages, replace the fixed disk adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

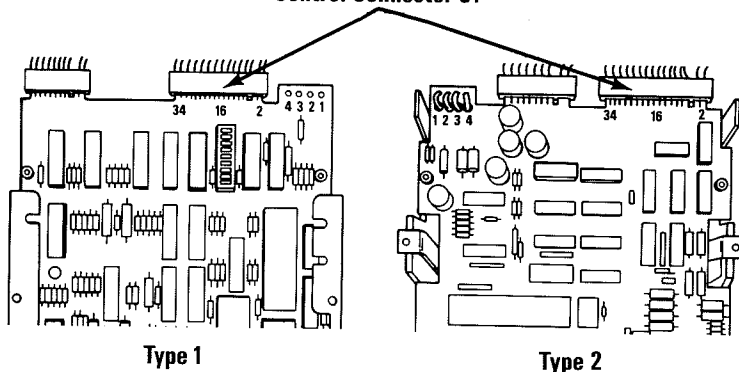
1. Press the spacebar once. "MEASUREMENT TEST 2 RUNNING" is now displayed on your screen. Do not press another key or spacebar until instructed to do so by the PIC.
2. Measure the voltages for a high or low reading as indicated in tables C and D.

Note: A High reading is 2.5 Vdc to 3.0 Vdc. A Low reading is .1 Vdc to .5 Vdc.

Table C		
Connector	Pin	Voltage
J1	24	Low
J1	26	Low
J1	34	Low

Table D		
Connector	Pin	Voltage
J1	10	High
J1	12	High

Control Connector J1



ARE THE VOLTAGES IN TABLES C AND D CORRECT?

NO If any of the voltages in Table C are incorrect, check the fixed disk cable then replace the fixed disk adapter.

If any of the voltages in Table D are incorrect, go to page 3-1700-11 and format drive C.

If both tables have incorrect voltages, replace the fixed disk adapter. See Section 5, "Removal/Replacement and Adjustments."

YES

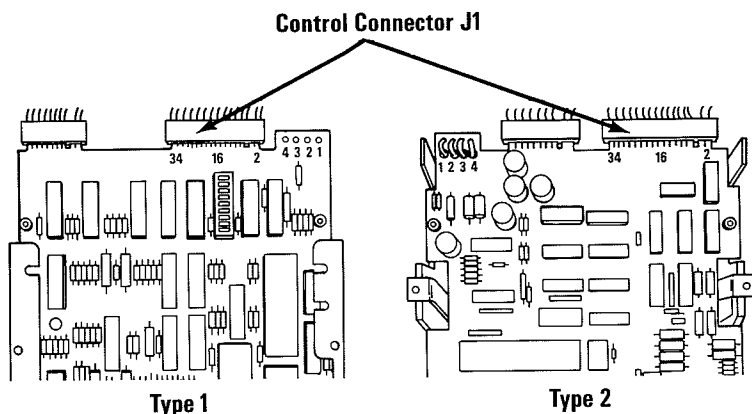
Fixed Disk

1. Press the spacebar once. "MEASUREMENT TEST 3 RUNNING" is now displayed on your screen. Do not press another key or spacebar until you complete the measurement test.
2. Measure the voltages for a high or low reading as indicated in tables E and F.

Note: A High reading is 2.5 Vdc to 3.0 Vdc. A Low reading is .1 Vdc to .5 Vdc.

Table E		
Connector	Pin	Voltage
J1	6	Low

Table F		
Connector	Pin	Voltage
J1	12	Low



ARE THE VOLTAGES IN TABLES E AND F CORRECT?

NO If the voltage in Table E is incorrect, check the fixed disk cable then replace the fixed disk adapter.

If the voltage in Table F is incorrect, go to page 3-1700-11 and format drive C.

If the voltages in both tables are incorrect, replace the fixed disk adapter. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-1700-14.

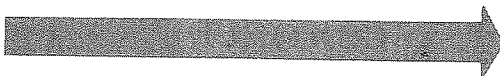
You have entered this page because you have identified a failing fixed disk drive. Before replacing a drive, you should try to format that drive first, then rerun diagnostics. Since all data on the fixed disk drive is destroyed during format, this should be the very last step taken before replacing a drive. After you format a fixed disk drive, the lost data can be loaded from the backup diskette onto the fixed disk drive.


To Format a Fixed Disk Drive

WARNING: All data on the fixed disk drive will be destroyed when formatted. Before loading data from backup diskettes, refer to the DOS manual for a description of the FDISK, FORMAT, BACKUP and RESTORE commands.

1. Set the Power switch on the system unit to Off.
2. Install any fixed disk drives and reconnect any data/control connectors that were removed while testing.
3. Load your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit and system unit to On.
5. After the diskette loads, press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.

CONTINUE



- 
1. Verify the installed devices. If any devices are missing from the installed devices list, follow the instructions on the display to add the missing options.
 2. When the SYSTEM CHECKOUT menu is displayed, press 0 (RUN TEST ONE TIME) then Enter.
 3. Select 17 (FIXED DISK DRIVE AND ADAPTER) then press Enter.


The following screen is displayed:

TESTING - X FIXED DISK DRIVE(S) & ADAPTER

- 0 - RUN FIXED DISK TEST
- 1 - RUN MEASUREMENTS TEST
- 2 - FORMAT FIXED DISK
- 9 - EXIT FIXED DISK TESTS

ENTER THE ACTION DESIRED ? -  -

CONTINUE 

- 
1. Press 2 (FORMAT FIXED DISK) then press Enter.
 2. When "ENTER DRIVE ID (C/D)" is displayed, press C or D (depending on which drive you want to format) then press Enter.
 3. When "ARE YOU SURE YOU WANT TO CONTINUE (Y/N)" is displayed, press Y then press Enter.
 4. After the format routine completes, go to page 3-1700-1 and rerun fixed disk diagnostics. Then return to this page and answer the question below.
-

DID THE ERROR REMAIN AFTER USING THE FORMAT ROUTINE?

NO The problem has been corrected and the backup data can be loaded from diskette.

YES Replace the fixed disk drive that failed. See Section 5, "Removal/Replacement and Adjustments."

You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.


1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should seek technical assistance.

Expansion Unit

You have entered this PIC because you were unable to complete the POST, you have an 18XX error code, or you suspect the expansion unit is failing. Make sure that all cables are seated correctly.

1. Set the Power switch on the system unit and expansion unit to Off.
 2. Insert your Advanced Diagnostics diskette in drive A.
 3. Set the Power switch on the expansion unit to On.
 4. Set the Power switch on the system unit to On.
 5. Proceed with running diagnostic routines, verify installed devices, and choose the system checkout you desire.
 6. Select 18 (EXPANSION OPTION) then press Enter.
- You may receive an error message similar to the one below.

TESTING - EXPANSION OPTION
X:XX:XX
ERROR - EXPANSION OPTION 18XX S
Data - XXXX = XX / XX SW = X
PRESS ENTER TO CONTINUE
? -  -

Expansion Unit

DID YOU GET AN 18XX ERROR CODE SIMILAR TO THE ONE ABOVE?

NO Go to page 3-2 "Start."

YES 




Find the error code listed below.

Error Code	Page
1810	3-1800-3
1811	3-1800-3
1812	3-1800-3
1813	3-1800-3
1814	3-1800-3
1815	3-1800-3
1816	3-1800-3
1817	3-1800-3
1818	3-1800-3
1819	3-1800-12
1820	3-1800-4
1821	3-1800-4

Go to the page listed in the table above for your error code.

1. Set the Power switch on the system unit and expansion unit to Off.
 2. Disconnect the expansion cable at the system unit.
 3. Make sure the Advanced Diagnostics diskette is loaded.
 4. Set the Power switch on the system unit to On.
 5. Proceed with running diagnostic routines, verify your installed devices and, choose the system checkout desired.
 6. Select 18 (EXPANSION OPTION) then press Enter.
-

TESTING - EXPANSION OPTION
X:XX:XX
ERROR - EXPANSION OPTION 1820 E
Data - XXXX = XX / XX SW = X
PRESS ENTER TO CONTINUE
? -  -


Expansion Unit


DID YOU GET AN 1820 ERROR CODE?

NO Replace the extender card. See Section 5,
"Removal/Replacement and Adjustments."

YES



- 
1. Set the Power switch on the system unit and expansion unit to Off.
 2. Connect the expansion cable at the system unit. (If it was removed in an earlier step.)
 3. Remove all option adapters from the expansion unit, except the receiver card.
 4. Make sure the Advanced Diagnostics diskette is loaded.
 5. Set the Power switch on the expansion unit to On.
 6. Set the Power switch on the system unit to On.
 7. Proceed with running diagnostic routines, verify devices installed, and choose the system checkout desired.
 8. Select 18 (EXPANSION OPTION) then press Enter.
-

TESTING - EXPANSION OPTION
X:XX:XX
ERROR - EXPANSION OPTION 18XX S
Data - XXXX = XX / XX SW = X
PRESS ENTER TO CONTINUE
? -  -

DID YOU GET AN 18XX ERROR CODE?

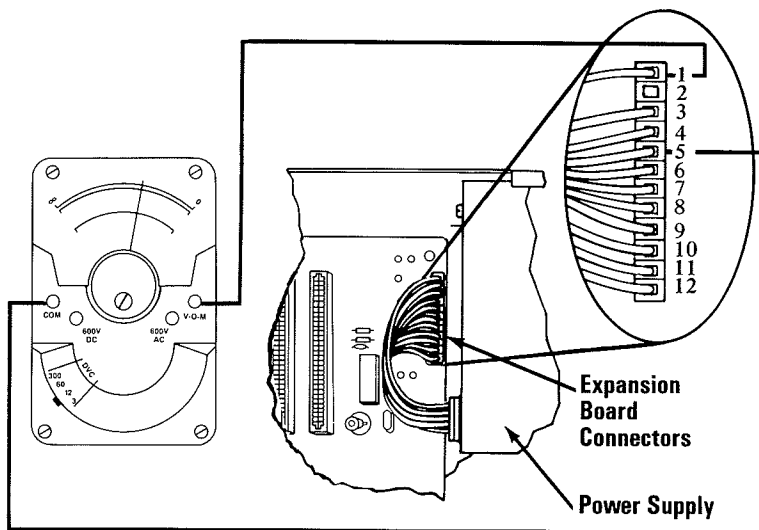
NO Go to page 3-1800-11.

YES 

You may have a voltage problem.

1. Set your multimeter to the 12 Vdc scale.
2. Check the expansion board power connector for the voltages listed in the table.

Voltage Connectors			
Min Vdc	Max Vdc	-Lead	+ Lead
2.4	5.2	5	1
4.8	5.2	5	10



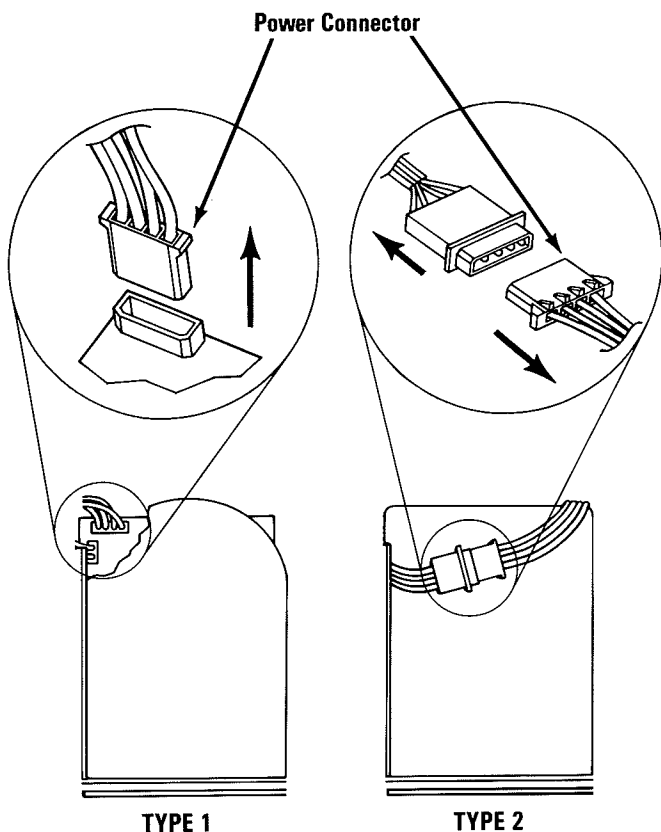
ARE ANY OF THE VOLTAGES NOT WITHIN THE CORRECT VALUES?

NO Replace the receiver card. See Section 5, "Removal/Replacement and Adjustments."

YES

Expansion Unit

1. Set the Power switches on the system unit and expansion unit to Off.
 2. Remove the power connector from the right side fixed disk drive.
 3. Set the Power switch on the expansion unit to On.
 4. Set the Power switch on the system unit to On.
-



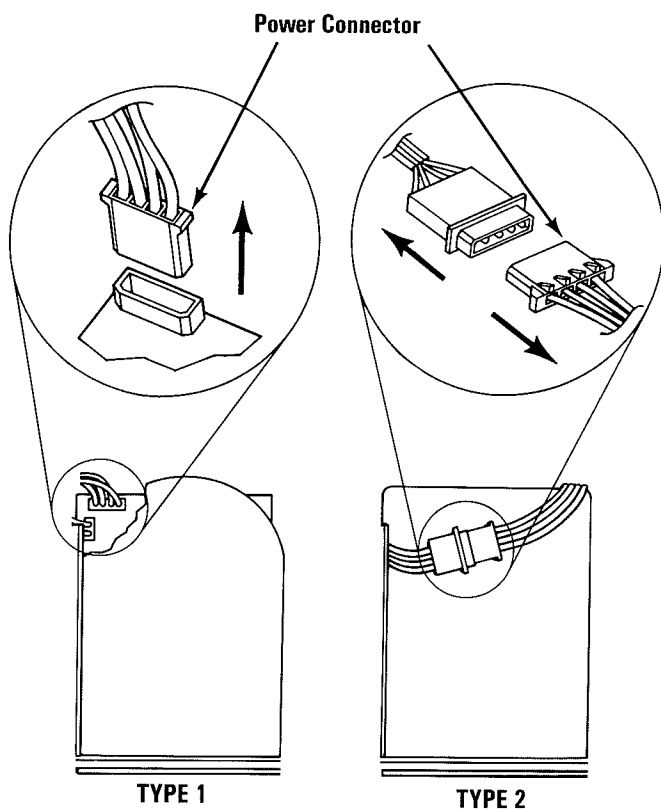
DID THE FAILING SYMPTOM REMAIN?

NO Replace the right side fixed disk drive assembly.
See Section 5, "Removal/Replacement and Adjustments."

YES 

Note: If you only have one fixed disk drive, continue on the next page.

1. Set the Power switches on the system unit and expansion unit to Off.
2. Remove the power connector from the left side fixed disk drive.
3. Set the Power switch on the expansion unit to On.
4. Set the Power switch on the system unit to On.



DID THE FAILING SYMPTOM REMAIN?

NO Replace the left side fixed disk drive assembly. See Section 5, "Removal/Replacement and Adjustments."

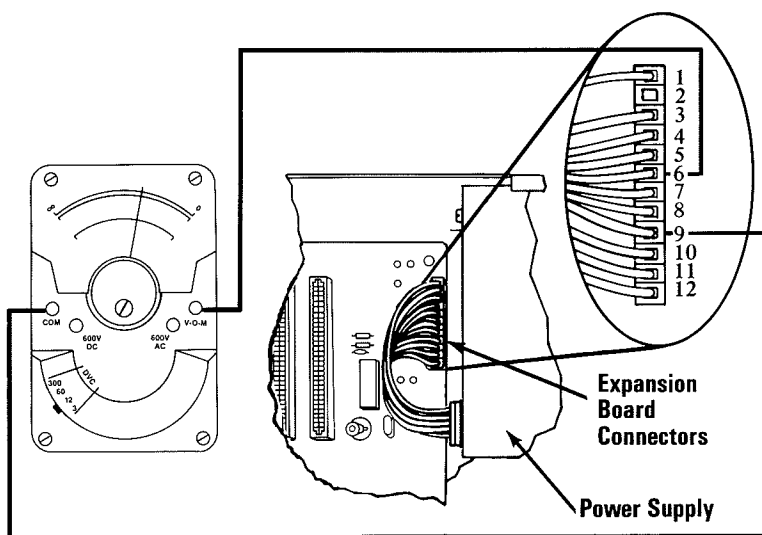
YES

Expansion Unit

Check the rest of the power supply output voltages to the expansion board.

1. Set your multimeter to the 12 Vdc scale.
2. Check the expansion board power connector for the voltages listed in the table.

Voltage Connectors			
Min Vdc	Max Vdc	-Lead	+ Lead
4.5	5.4	9	6
11.5	12.6	7	3
10.8	12.9	4	8



ARE THE VOLTAGES WITHIN THE CORRECT VALUES?

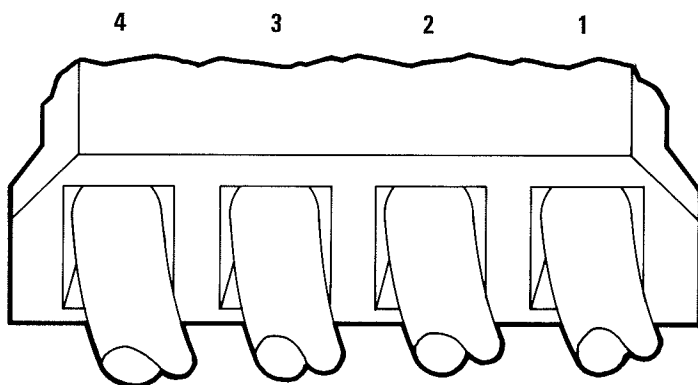
NO Replace the expansion unit power supply. See Section 5, "Removal/Replacement and Adjustments."

YES

Check the fixed disk drive voltages.

1. Reconnect the fixed disk drive power supply connectors.
2. Refer to the diagram below for the proper voltage readings. You should get the same readings on both fixed disk drive connectors.

Fixed Disk Drive Connector			
Min Vdc	Max Vdc	-Lead	+ Lead
4.8	5.2	2	4
11.5	12.6	3	1



ARE THE VOLTAGES WITHIN THE CORRECT VALUES?

NO Replace the expansion unit power supply. See Section 5, "Removal/Replacement and Adjustments."

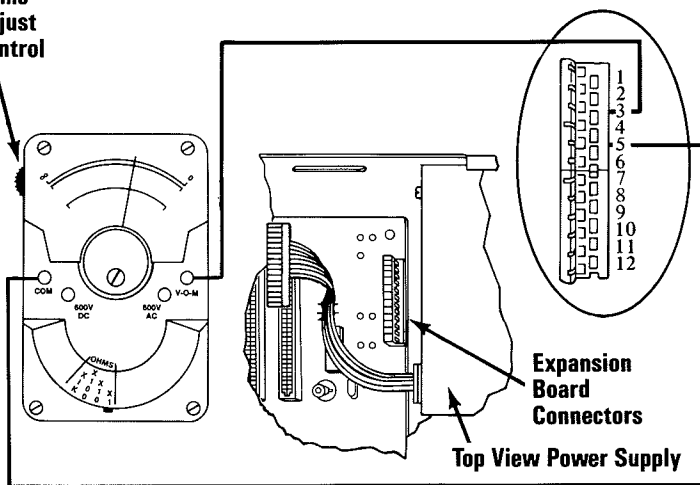
YES

Expansion Unit

1. Set the Power switch on the system unit and the expansion unit to Off.
2. Set your multimeter to the Ohms $\times 1$ scale.
3. Remove all option adapters (including the receiver card) from the expansion slots in the expansion unit.
4. Remove the expansion board power connectors and take resistance measurements on the expansion board pins listed in the table.

- Lead	5	6	7	8	8	8
+ Lead	3	4	9	10	11	12
Minimum Resistance	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms

Ohms
Adjust
Control




ARE ANY OF THE RESISTANCE MEASUREMENTS BELOW THE MINIMUM SHOWN IN THE TABLE?

NO Replace the expansion unit power supply. See Section 5, "Removal/Replacement and Adjustments."

YES Replace the expansion board. See Section 5, "Removal/Replacement and Adjustments."

One of the option adapters plugged into the expansion board may be failing.

1. Set the Power switches on the system unit and the expansion unit to Off.
 2. Replace one option adapter.
 3. Make sure the Advanced Diagnostics diskette is loaded.
 4. Set the Power switch on the expansion unit to On.
 5. Set the Power switch on the system unit to On.
 6. Proceed with running diagnostic routines, verify installed devices, and choose the system checkout you desire.
 7. Select 18 (EXPANSION OPTION) then press Enter.
-

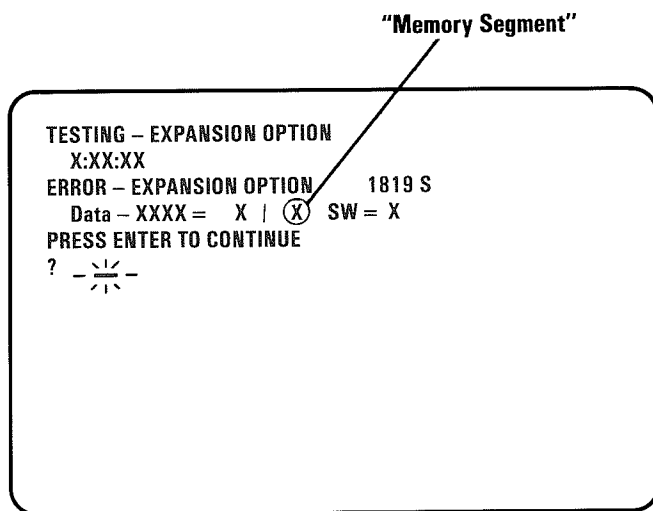
TESTING - EXPANSION OPTION
X:XX:XX
ERROR - EXPANSION OPTION 18XX S
Data - XXXX = X / X SW = X
PRESS ENTER TO CONTINUE
? - 

DID YOU GET AN 18XX ERROR CODE?

NO Repeat the steps above until the failing option adapter is found.

YES Replace the option adapter you just plugged in the expansion board. See Section 5, "Removal/Replacement and Adjustments."

Your screen will look similar to the one below. Verify that the switch settings on the extender card correctly reflect the “Memory Segment.” Use the “Extender Card Switch Settings” chart in Section 6.



ARE THE EXTENDER CARD SWITCHES SET TO CORRECTLY REFLECT THE “MEMORY SEGMENT”?

NO Set the extender card switches to reflect the correct “Memory Segment.”

YES Replace the extender card. See Section 5, “Removal/Replacement and Adjustments.”

Binary Synchronous Communications (BSC)

You have entered this PIC because you have a 20XX error code or have identified a problem with binary synchronous communications (BSC).

1. Check that the jumpers are set correctly on the BSC adapter(s). See Section 4, "Locations."
2. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
3. Insert your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit (if attached) and the system unit to On.

The menu below should be displayed.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981,1982

SELECT AN OPTION

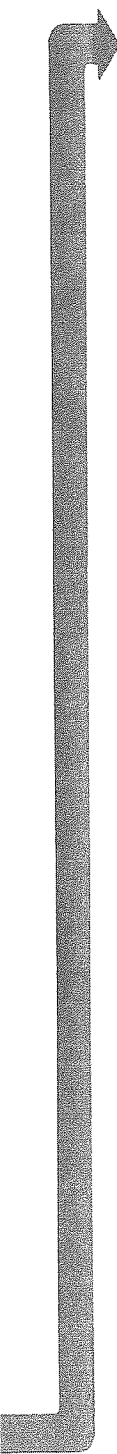
- 0 – RUN DIAGNOSTIC ROUTINES
- 1 – FORMAT DISKETTE
- 2 – COPY DISKETTE
- 3 – PREPARE SYSTEM FOR RELOCATION
- 9 – EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? _

CONTINUE





Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
- (Skip Step 2 if you have only one display adapter installed.)
2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N) ?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N) ?) then press Enter. (If the list is not correct, follow the instructions on your screen and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 20 (BSC ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS ADAPTER CABLE ATTACHED TO THE BSC ADAPTER (Y/N) ?) then press Enter.

The screen should now instruct you to install the wrap plug on either the BSC adapter, or on the IBM Communications Adapter Cable.

TESTING - BSC ADAPTER
IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE BSC ADAPTER? (Y/N)?
Y

DISCONNECT THE CABLE AT THE MODEM AND
INSTALL THE WRAP PLUG ON THE END OF
THE CABLE.
PRESS ENTER WHEN READY.
?

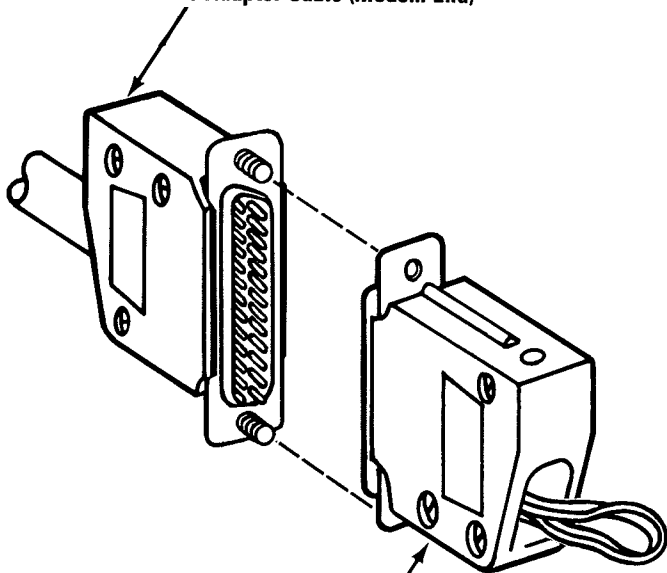
**IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED?**

NO Go to page 3-2000-4.

YES 

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
 2. Press Enter to begin the test. The test may take up to 15 seconds.
-

IBM Communications Adapter Cable (Modem End)



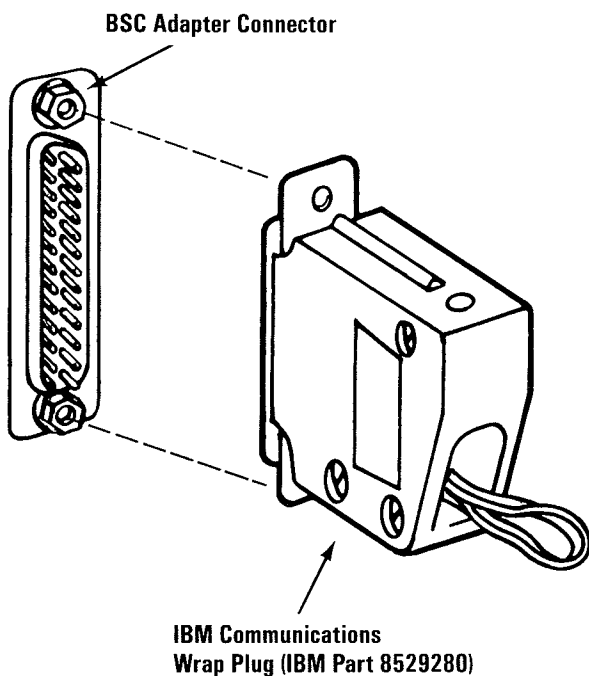
IBM Communications Adapter
Wrap Plug (IBM Part 8529280)

**DOES THE MESSAGE ON YOUR SCREEN
INSTRUCT YOU TO MOVE THE WRAP PLUG
FROM THE END OF THE CABLE TO THE
CONNECTOR ON THE BSC ADAPTER?**

NO Go to page 3-2000-5.

YES 

1. Remove the communications cable (if attached) from the BSC Adapter.
 2. Refer to the figure below and install the wrap plug on the BSC Adapter.
 3. Press Enter to begin the test. This test takes up to 15 seconds.
-



DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message says to replace the cable, do so. If it says to replace the BSC Adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-2000-6.

You may have an error message similar to the one below.

X:XX:XX
ERROR – BSC ADAPTER 20XX X
REPLACE THE BSC ADAPTER.

**DID THE TEST RUN WITHOUT AN ERROR
MESSAGE?**

NO Replace the BSC Adapter.

YES



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

Alternate Binary Synchronous Communications (Alt. BSC.)

You have entered this PIC because you have a 21XX error code or have identified a problem with alternate binary synchronous communications (Alt. BSC).

1. Check that the jumpers are set correctly on the BSC and alternate BSC adapters and that you do not have an SDLC adapter installed. See Section 4, "Locations."
2. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
3. Insert your Advanced Diagnostics diskette in drive A.
4. Set the Power switch on the expansion unit (if attached) and the system unit to On.

The menu below should be displayed.

The IBM Personal Computer
ADVANCED DIAGNOSTICS
Version 2.XX (C)Copyright IBM Corp 1981, 1982

SELECT AN OPTION


- 0 - RUN DIAGNOSTIC ROUTINES
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR RELOCATION
- 9 - EXIT TO SYSTEM DISKETTE

ENTER THE ACTION DESIRED

? _

CONTINUE





Follow the steps below to run the diagnostic routines.

1. Press 0 (RUN DIAGNOSTIC ROUTINES) then press Enter.
- (Skip Step 2 if you have only one display adapter installed.)
2. Press Y or N (IS A MONITOR ATTACHED TO EVERY DISPLAY ADAPTER (Y/N)?) then press Enter.
3. Press Y or N (IS THE LIST CORRECT (Y/N)?) then press Enter. (If the list is not correct, follow the instructions on your screen and correct the list before answering yes.)
4. Press 0 (RUN TESTS ONE TIME) then press Enter.
5. Select 21 (ALT BSC ADAPTER) then press Enter.
6. Press Y or N (IS AN IBM COMMUNICATIONS ADAPTER CABLE ATTACHED TO THE ALT BSC ADAPTER (Y/N)?) then press Enter.

The screen should now instruct you to install the wrap plug on either the Alternate BSC Adapter, or on the IBM Communications Adapter Cable.

TESTING – ALT BSC ADAPTER
IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED TO THE ALT BSC ADAPTER (Y/N)?
Y

DISCONNECT THE CABLE AT THE MODEM AND
INSTALL THE WRAP PLUG ON THE END OF
THE CABLE.
PRESS ENTER WHEN READY.
?

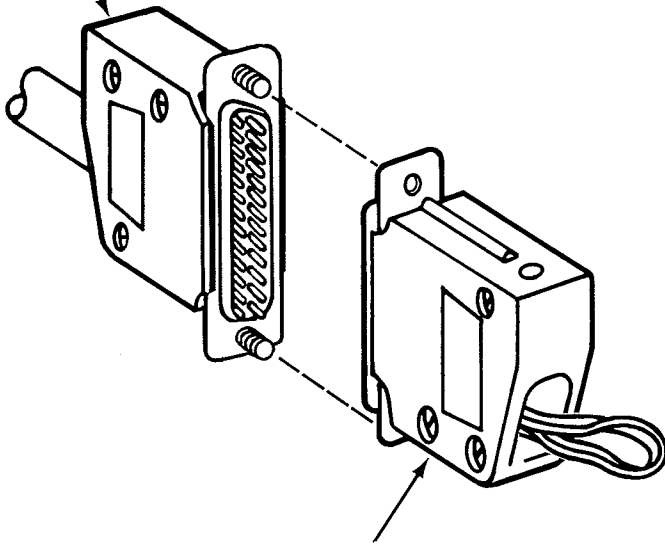
**IS AN IBM COMMUNICATIONS ADAPTER CABLE
ATTACHED?**

NO Go to page 3-2100-4.

YES 

1. Refer to the figure below and install the wrap plug on the modem end of the IBM Communications Adapter Cable.
2. Press Enter to begin the test. The test may take up to 15 seconds.

IBM Communications Adapter Cable (Modem End)



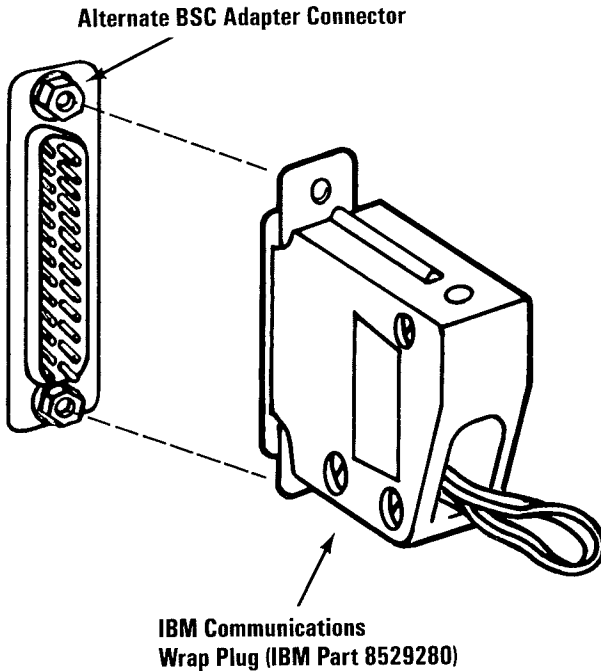
IBM Communications Adapter
Wrap Plug (IBM Part 8529280)

**DOES THE MESSAGE ON YOUR SCREEN
INSTRUCT YOU TO MOVE THE WRAP PLUG
FROM THE END OF THE CABLE TO THE
CONNECTOR ON THE ALT BSC ADAPTER?**

NO Go to page 3-2100-5.

YES

1. Remove the communications cable (if attached) from the Alternate BSC Adapter.
 2. Refer to the figure below and install the wrap plug on the Alternate BSC Adapter.
 3. Press Enter to begin the test. This test takes up to 15 seconds.
-



DID THE TEST RUN WITHOUT AN ERROR?

NO If the error message directs you to replace the cable, do so. If it says to replace the Alternate BSC Adapter, do so. See Section 5, "Removal/Replacement and Adjustments."

YES Go to page 3-2100-6.

You may have an error message similar to the one below.

Alt. Bisyndh

X:XX:XX
ERROR - ALT BSC ADAPTER 21XX X
REPLACE THE ALT BSC ADAPTER.

DID THE TEST RUN WITHOUT AN ERROR MESSAGE?

NO Replace the Alternate BSC Adapter.

YES



You have gone through the PICs without solving your problem. The following steps should help you find additional audio or visual symptoms.

1. Check the entire system for loose or damaged connectors.
2. Return to page 3-2 and review "Start."
3. Select "UTILITIES" in the diagnostic menu, start an error log, and select "RUN TESTS MULTIPLE TIMES." This will allow you to operate the machine thoroughly and identify the failing symptom. When you have identified the symptom, go to page 3-2, "Start," or the appropriate PIC for the symptom you received.

If you have followed these procedures and still have an unsolved problem, you should request technical assistance.

SECTION 4. LOCATIONS

Diskette Drive Type 1

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Latch Assembly	4-6
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Write Protect Switch	4-5

Diskette Drive Type 2

Cone Assembly	4-9
Cone Lever Arm Assembly	4-9
Connectors	4-9
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Front Panel	4-9
Index Assembly	4-9
Latch Assembly	4-9
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Diskette Drive Type 2 (Cont.)

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Spindle	4-9
Stepper Motor	4-9
Terminating Resistor	4-10
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Expansion Unit

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Receiver Card	4-14

Fixed Disk Drive

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-----------------------------	------

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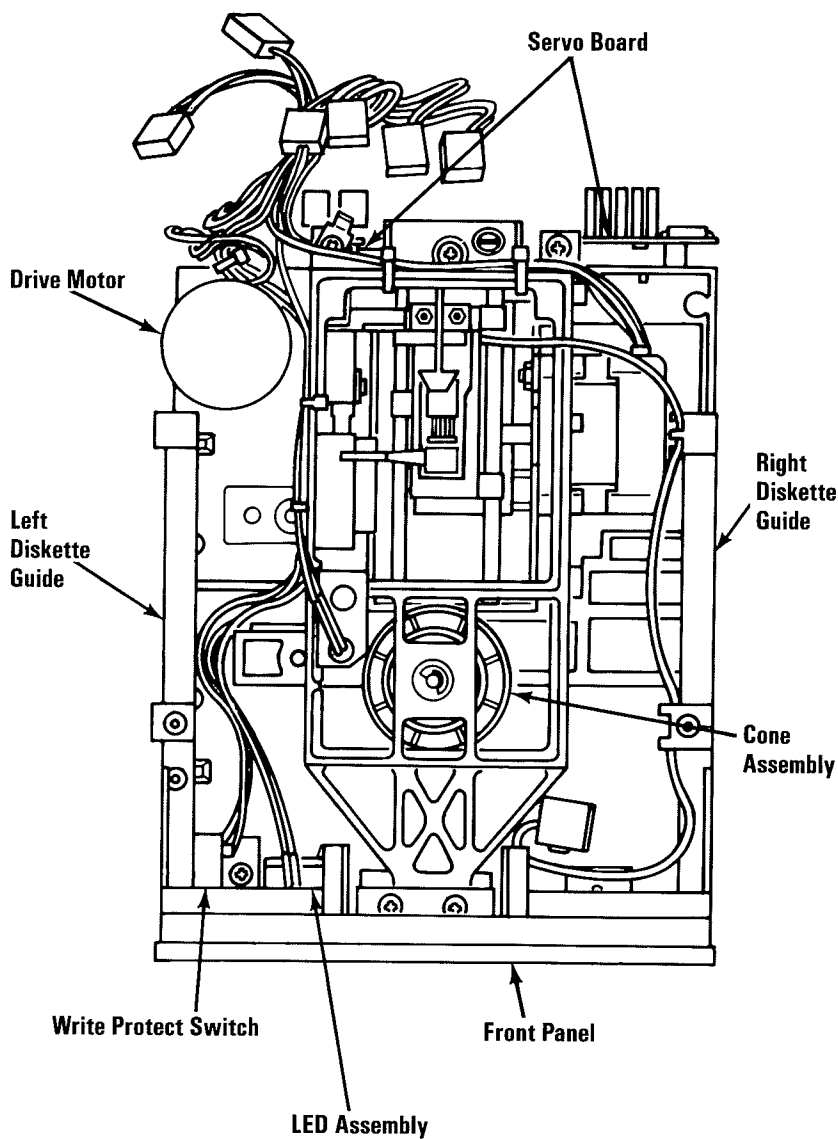
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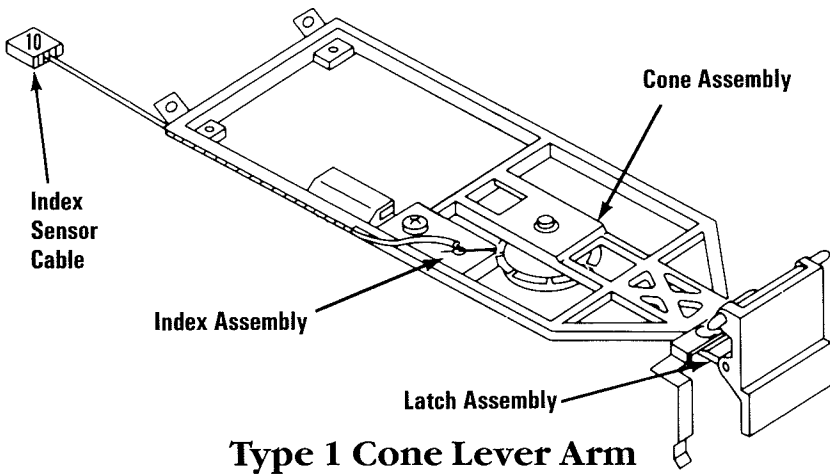
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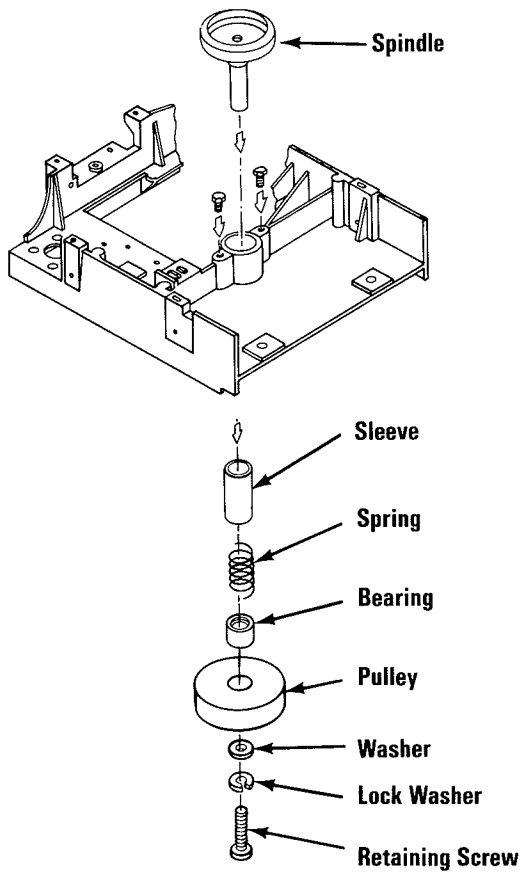
Diskette Drive



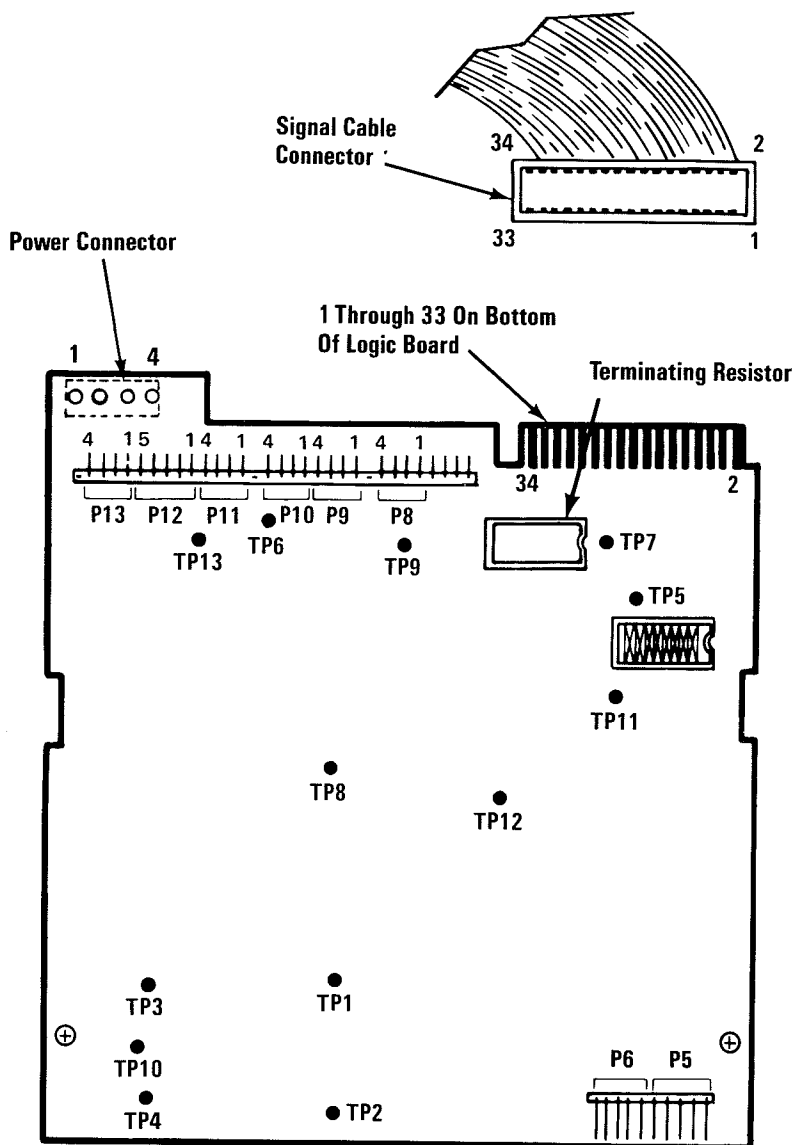
**Type 1 Diskette Drive Assembly
(Top View)**



**Type 1 Cone Lever Arm
(Left View)**

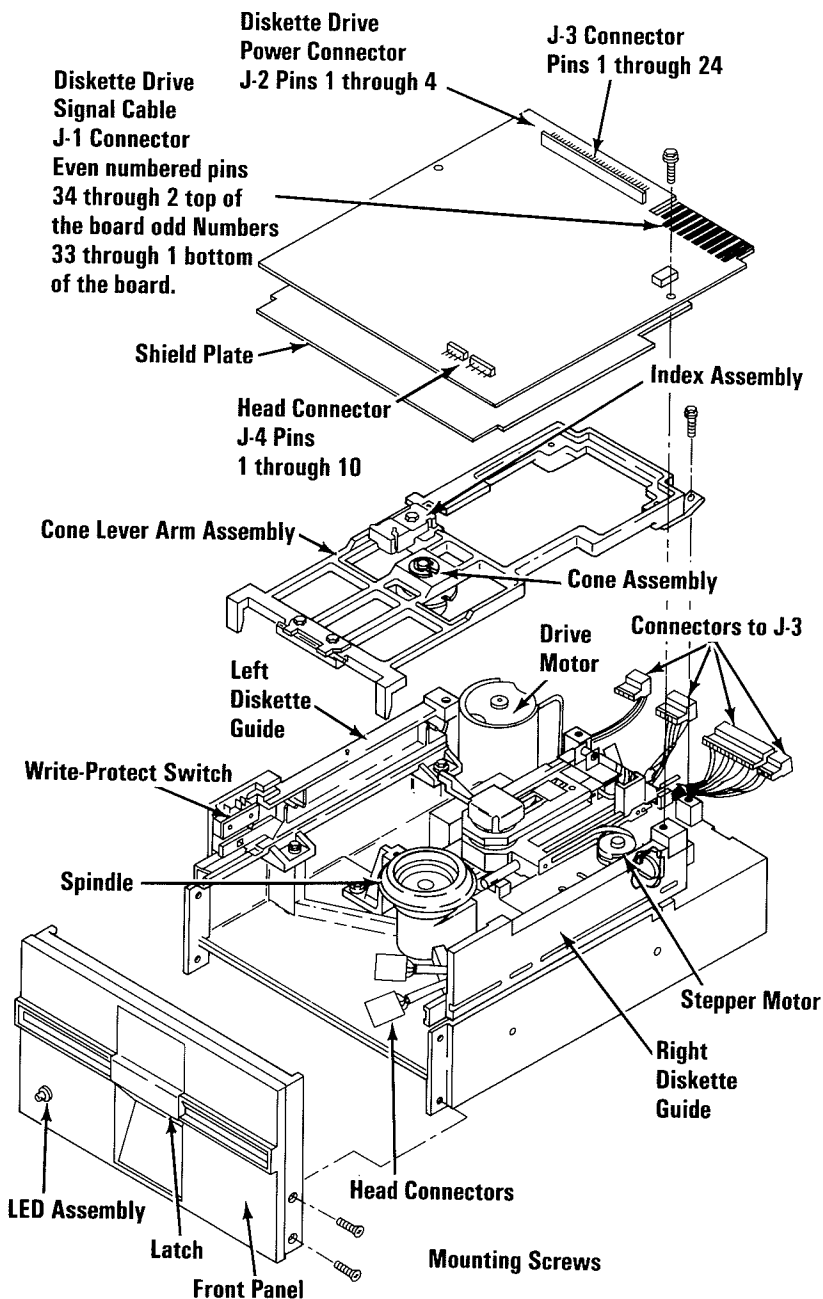


**Type 1 Spindle Assembly
(Left View)**

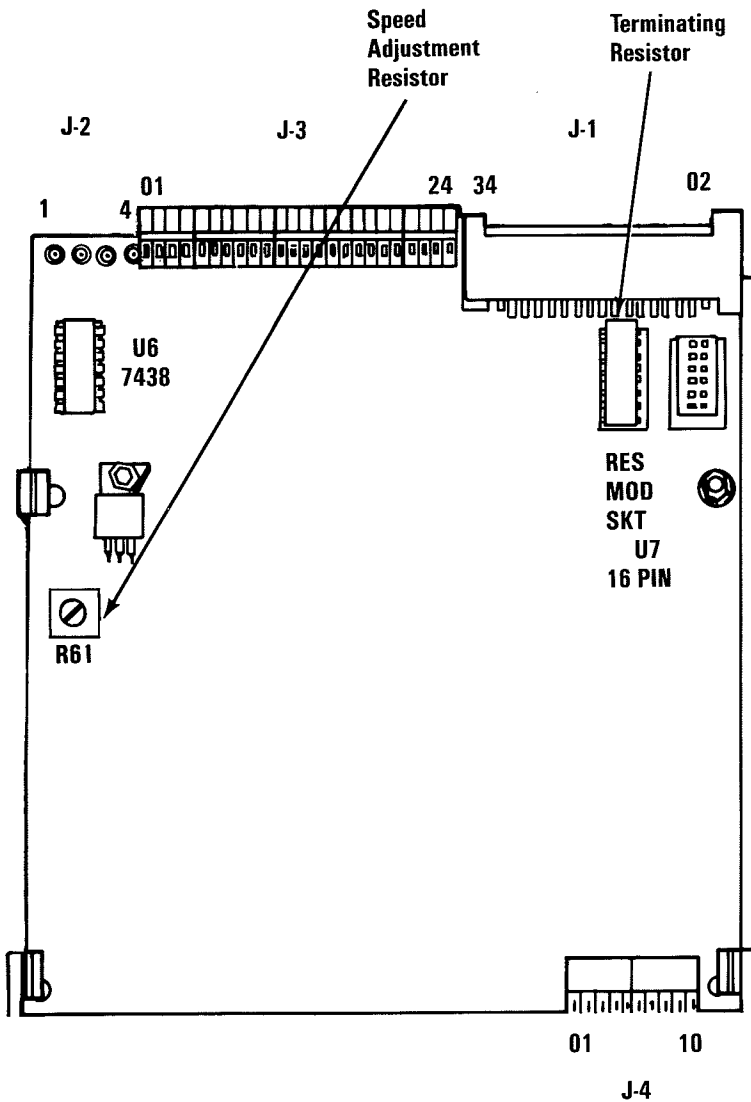


**Type 1 Logic Printed Circuit Board
(Top View)**

Notes:

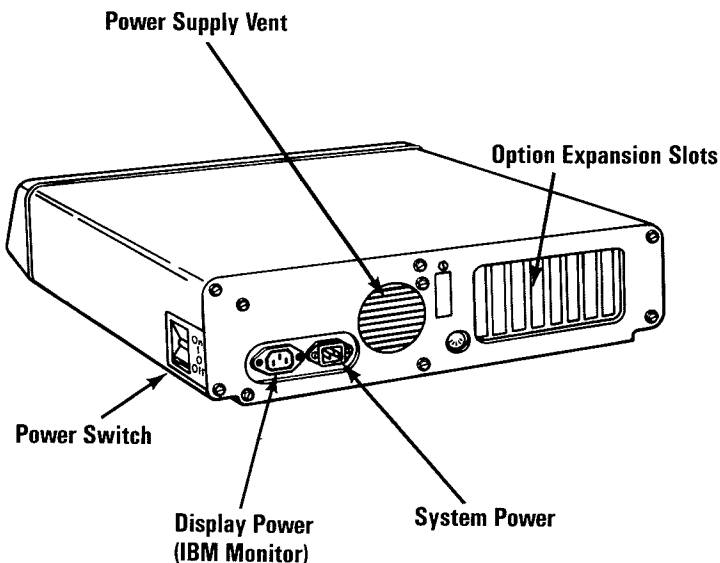


Type 2 Diskette Drive Assembly

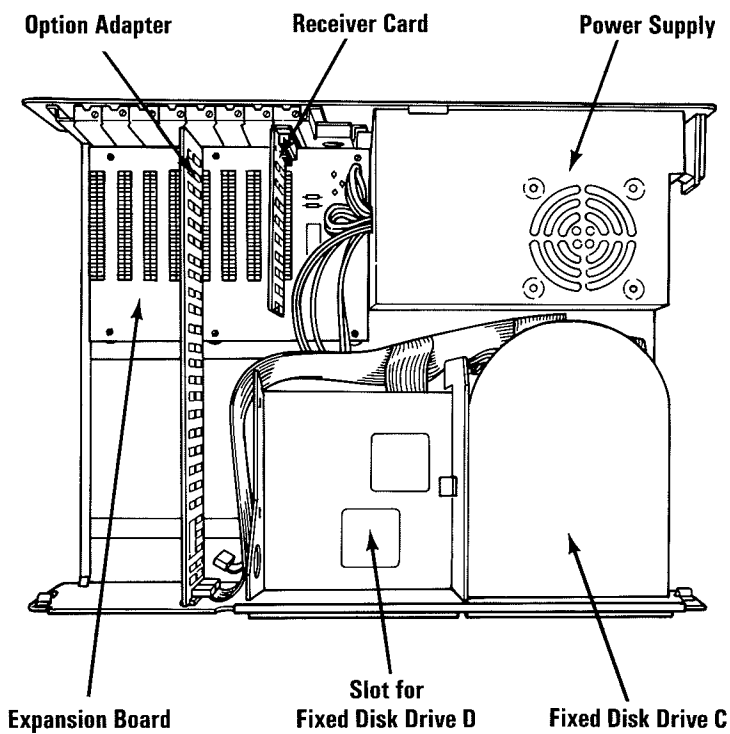


**Type 2 Diskette Drive Logic
Printed Circuit Board**

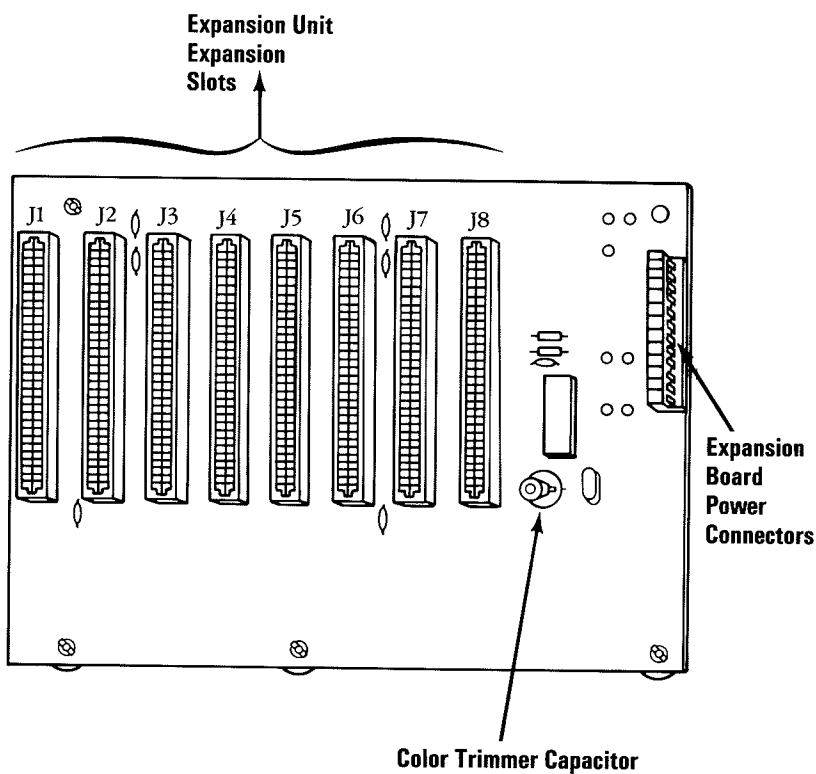
Expansion Unit



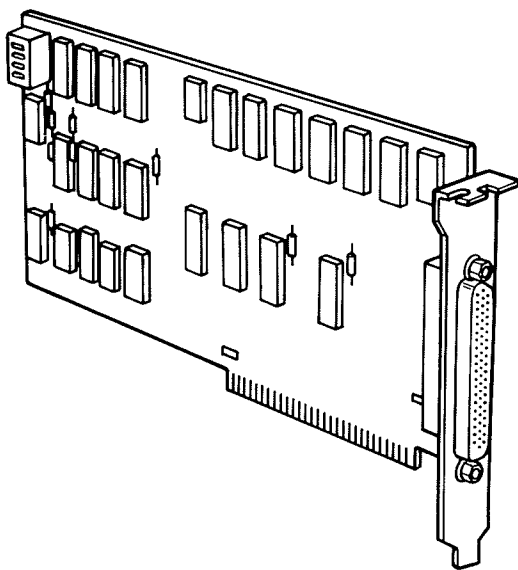
**Expansion Unit
(Rear View)**



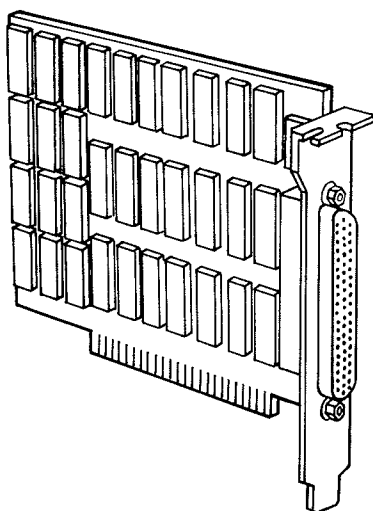
**Expansion Unit
(Top View)**



Expansion Board



**Extender Card
(Right View)**

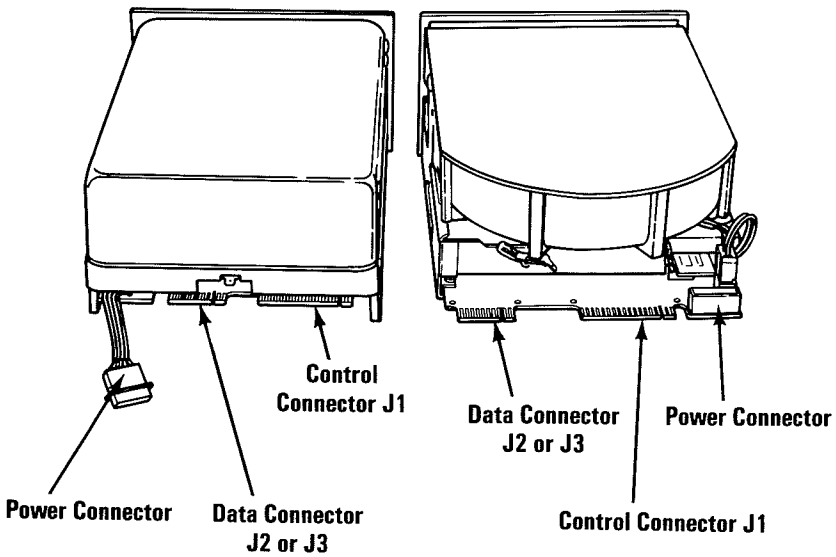


**Receiver Card
(Right View)**

10 Megabyte Fixed Disk Drive

Type 2

Type 1

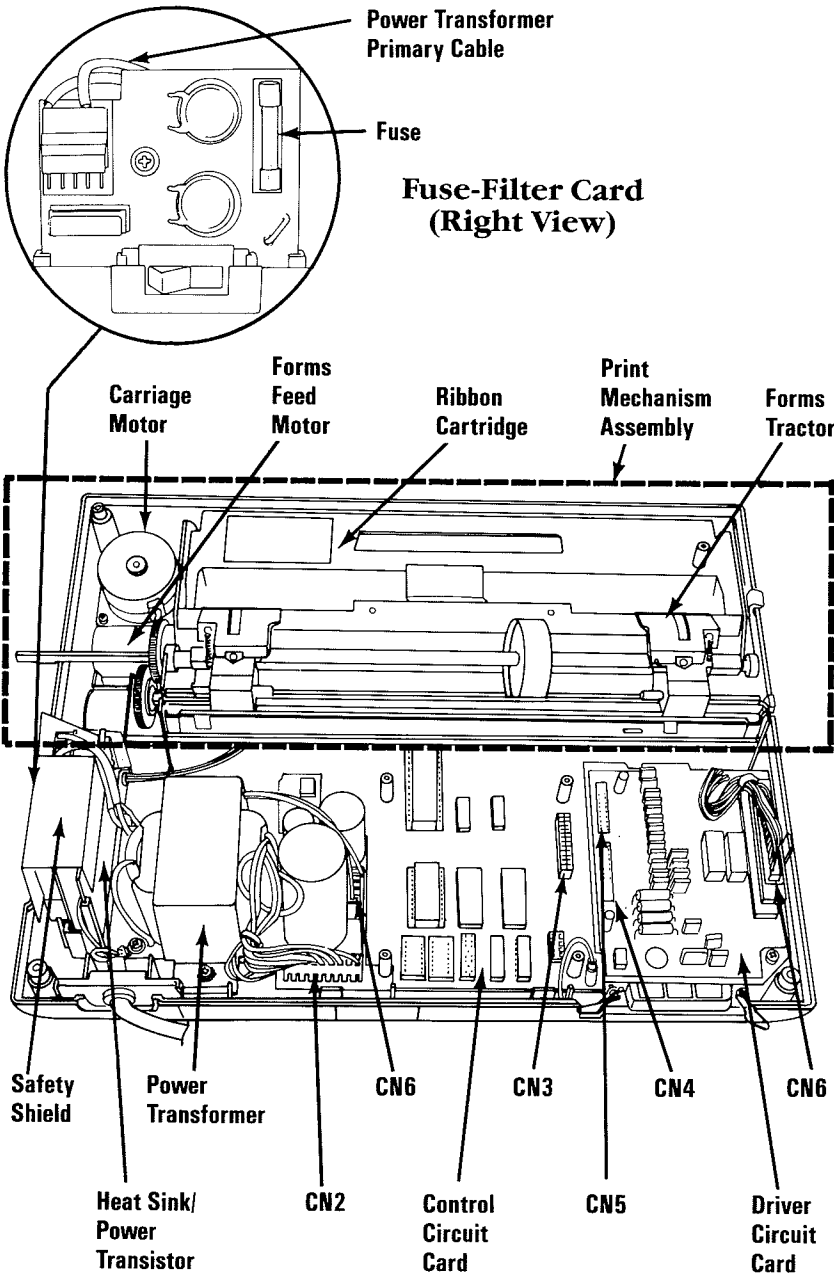


Note: The top of type 1 drives may vary slightly in appearance.

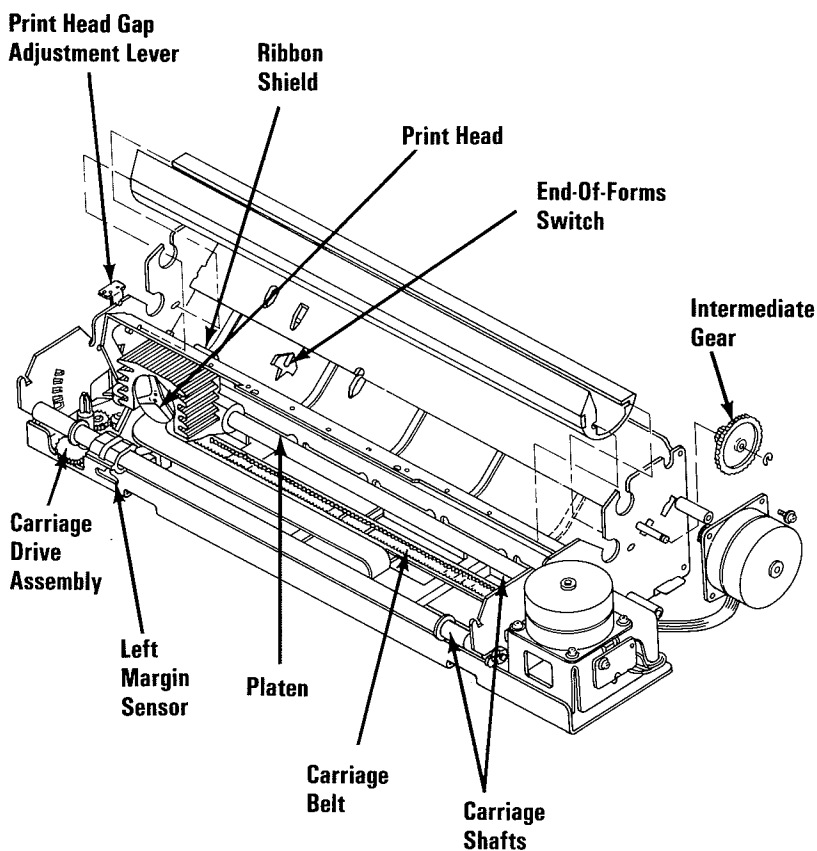
Fixed Disk Drive (Rear View)

Notes:

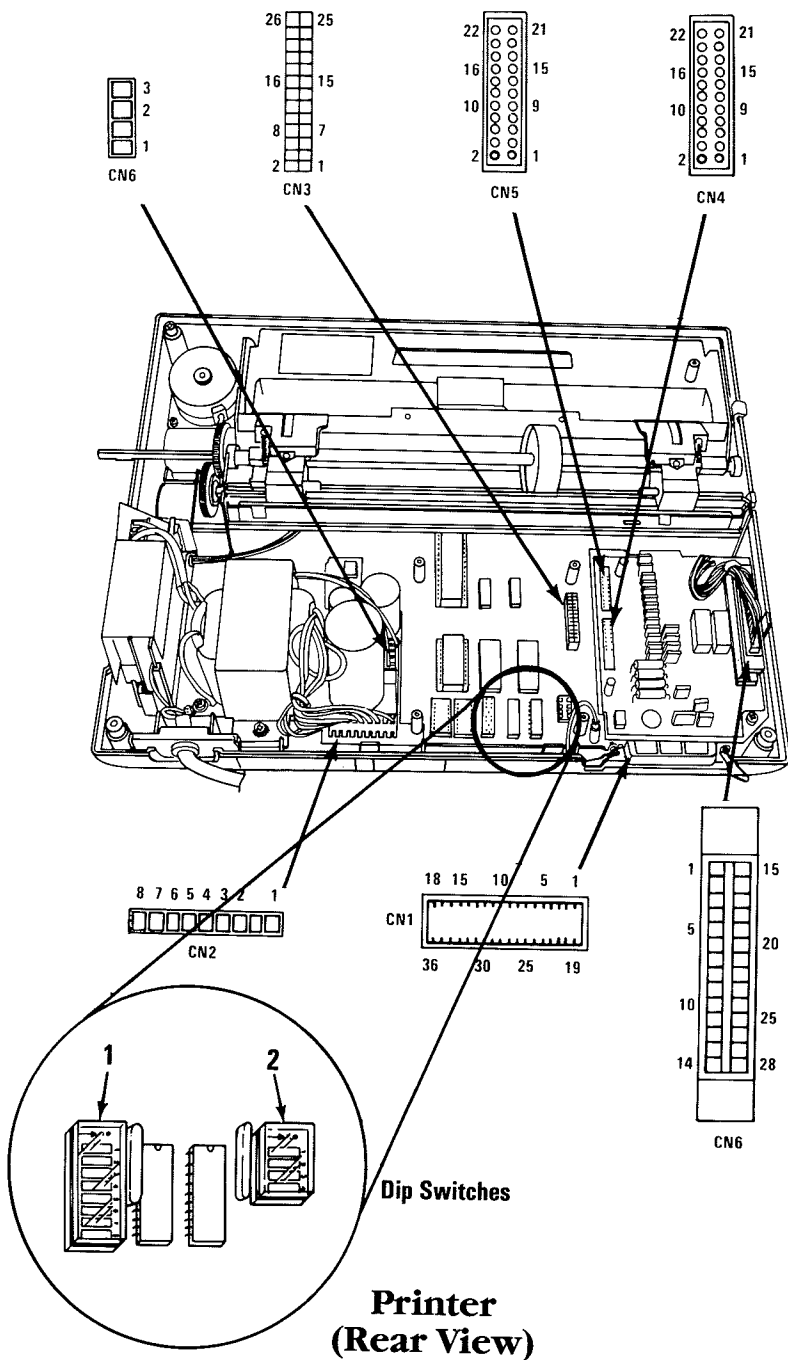
IBM 80 CPS Matrix Printer

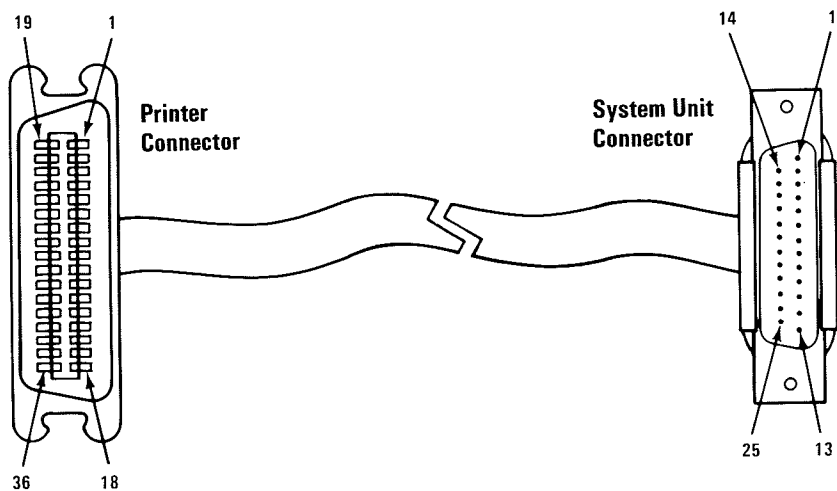


**Printer
(Rear View)**



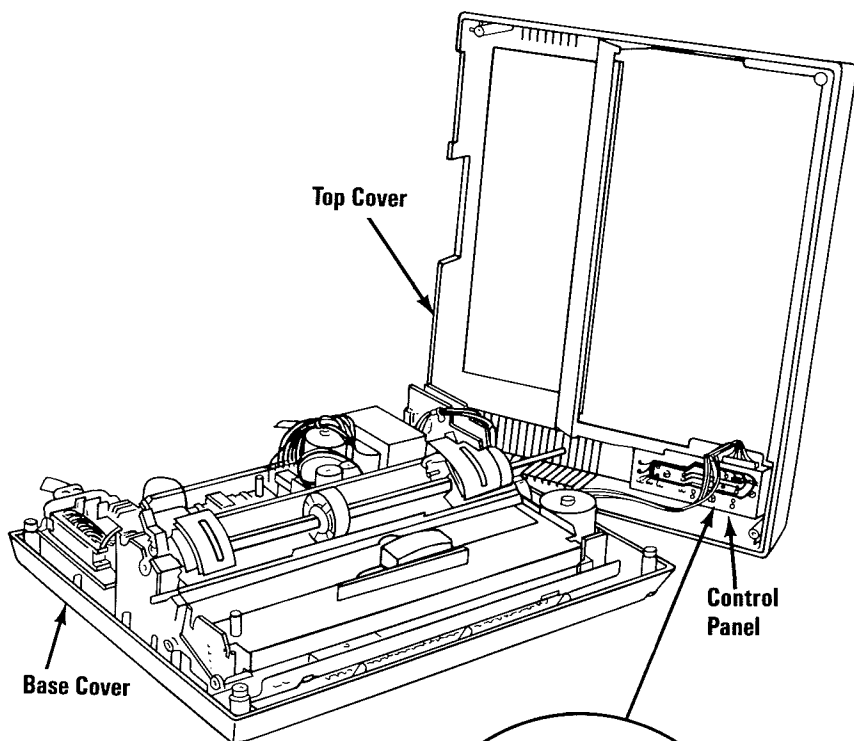
**Print Mechanism Assembly
(Front View)**





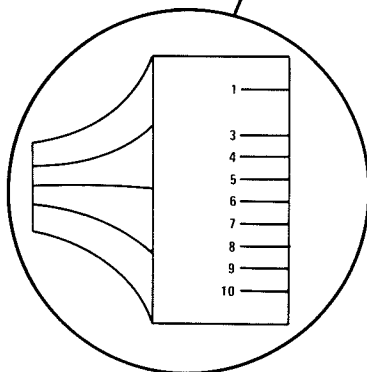
Printer Signal Cable

Printer Connector Pin Number	System Unit Connector Pin Number
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
32	15
31	16
36	17
33	18
19	19
21	20
23	21
25	22
27	23
29	24
30	25

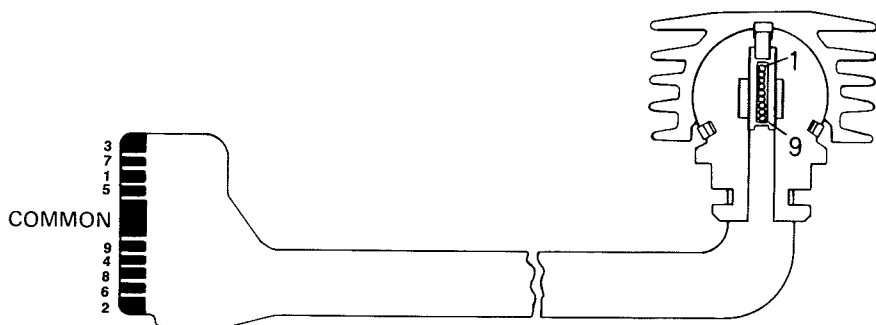


Printer (Top View)

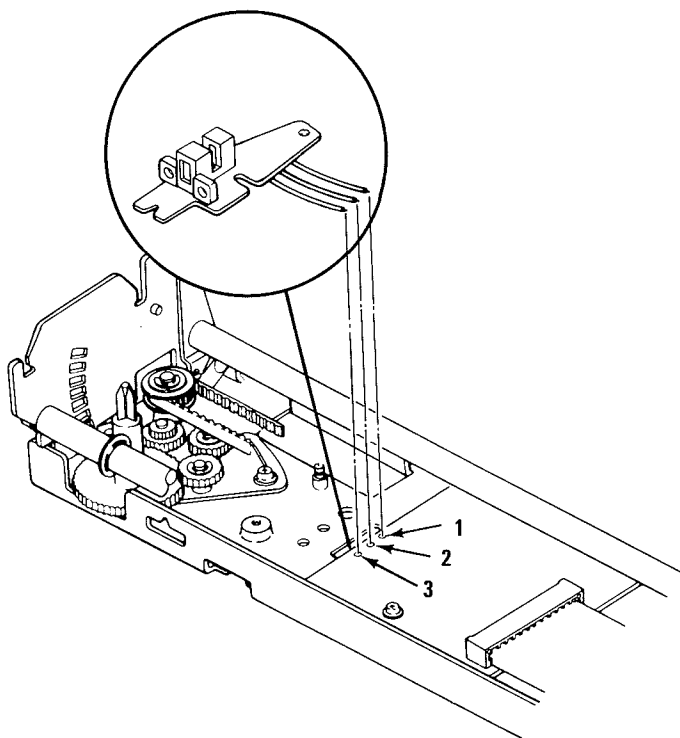
Pin	Name
1	Online Light
2	Key
3	No Paper Light
4	Ready Light
5	Online Switch
6	Forms Feed
7	Line Feed
8	Ground
9	+ 12 Vdc
10	Alarm



Control Panel Connector

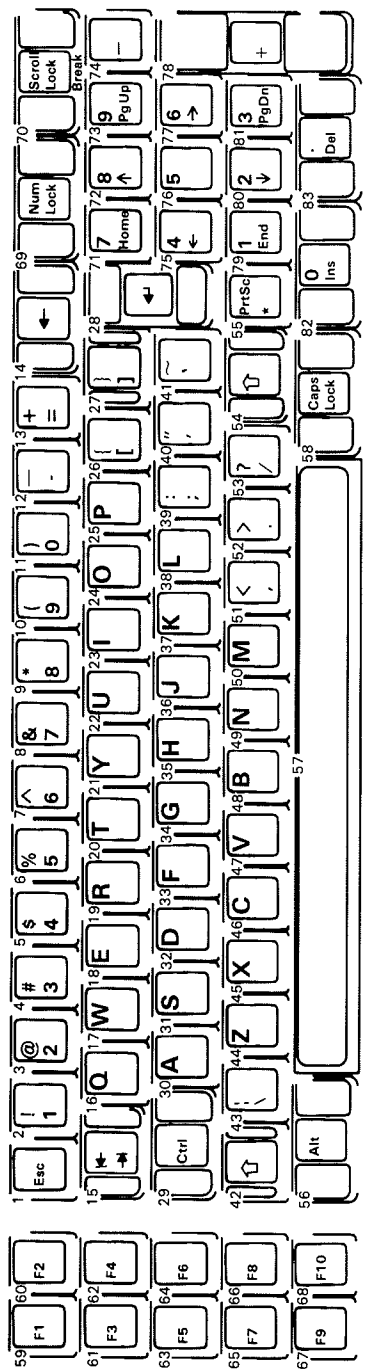


**Print Head and Cable
(Rear View)**

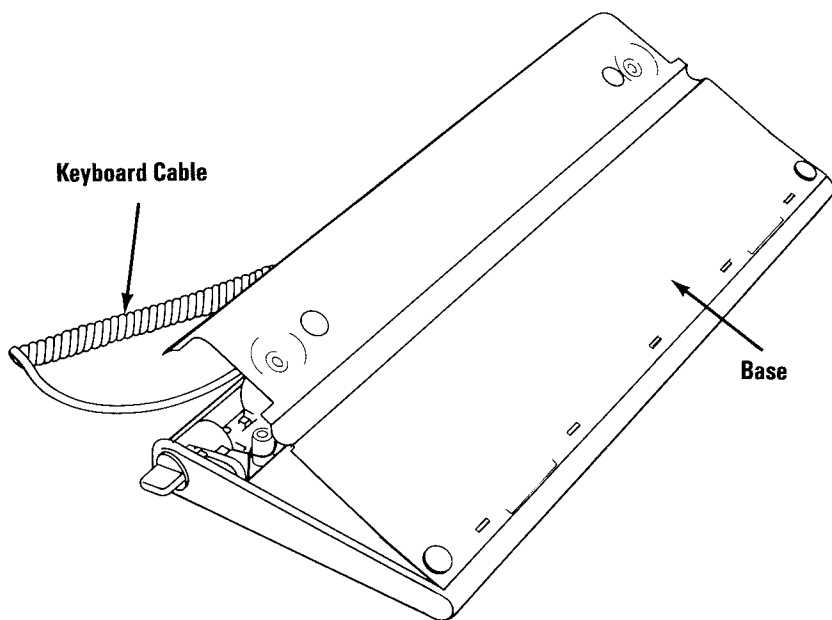


**Left Margin Sensor
(Front View)**

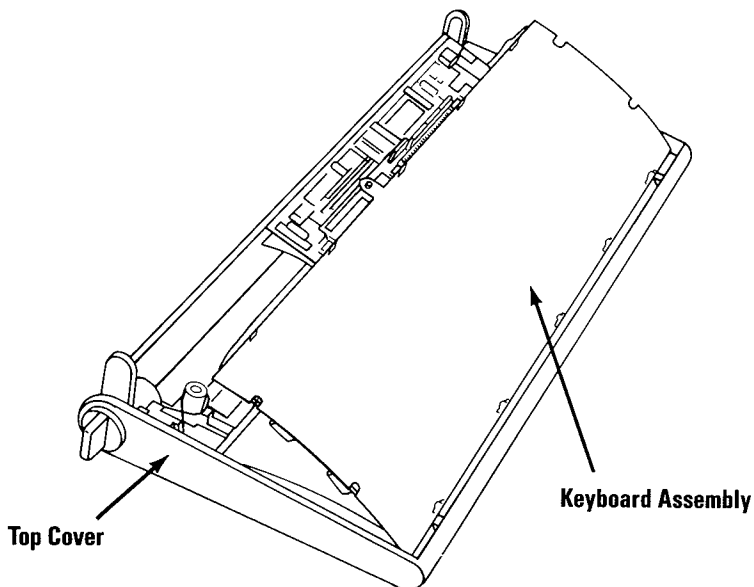
Keyboard



The Number To The Upper Left Designates The Key Position In The Parts Catalog (See Section 7)

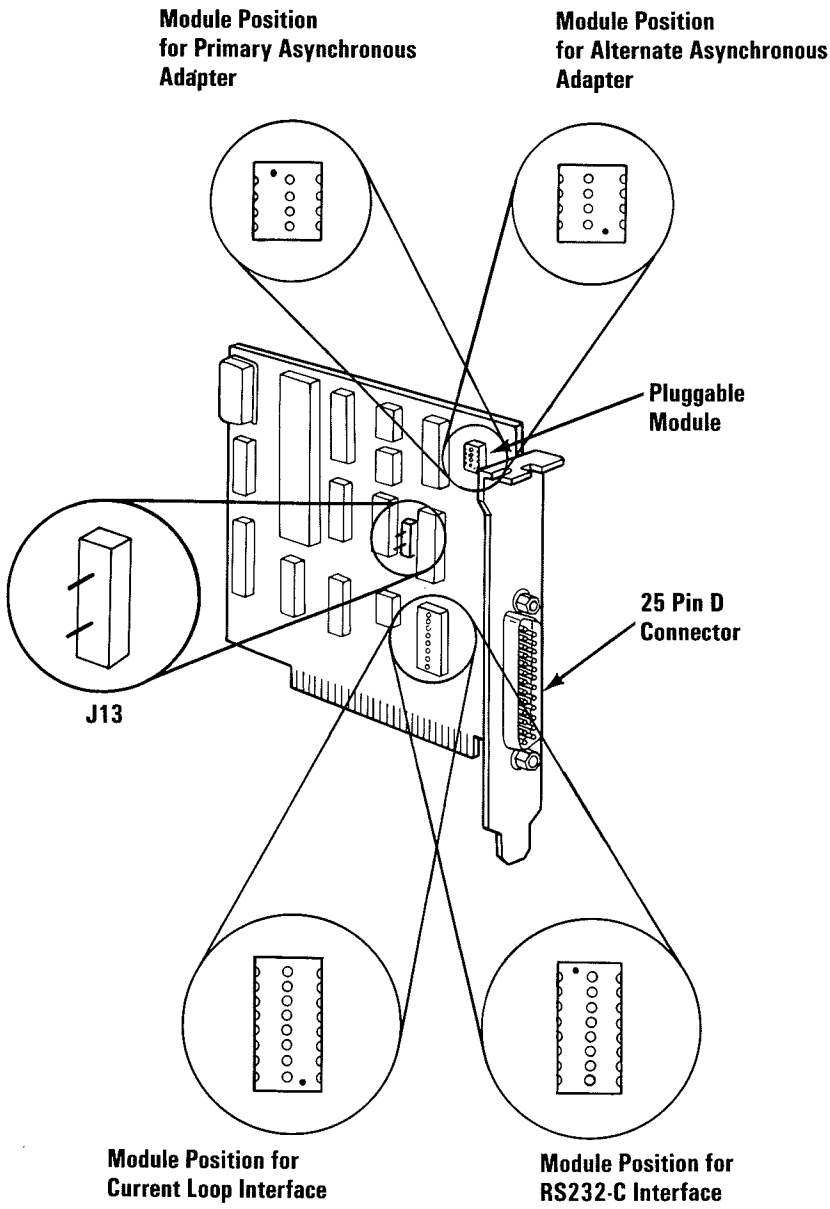


**Keyboard
(Bottom View)**

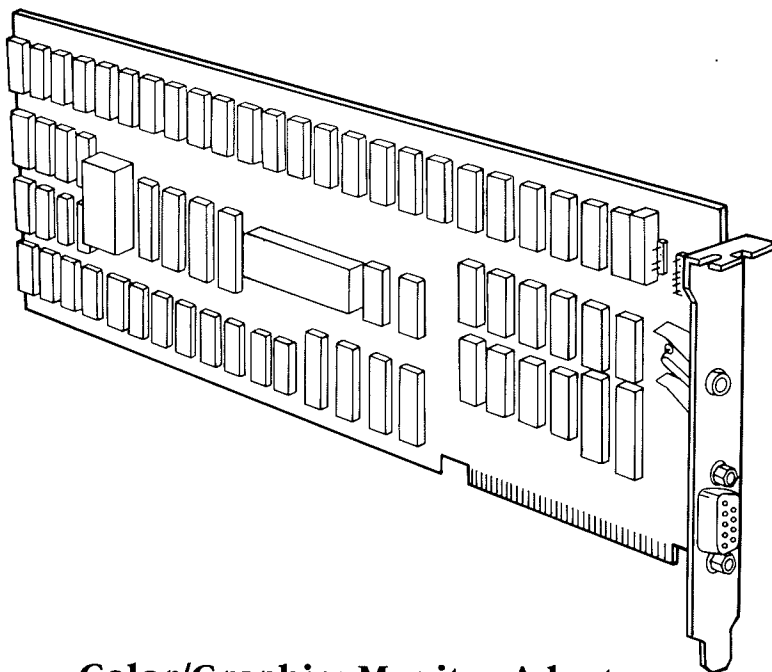


**Keyboard
(Bottom View)**

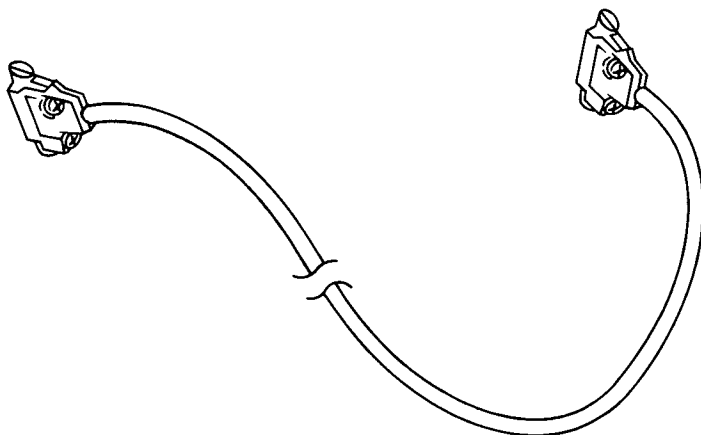
Option Adapters



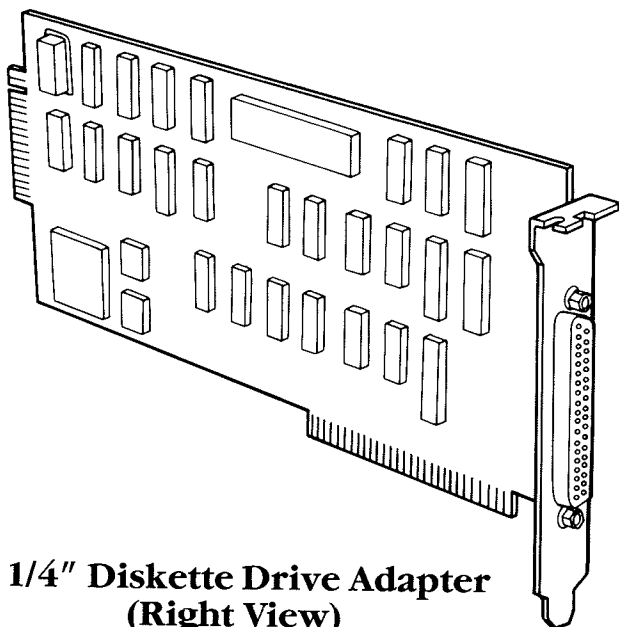
**Asynchronous Communications Adapter
and Adapter Address (Right View)**



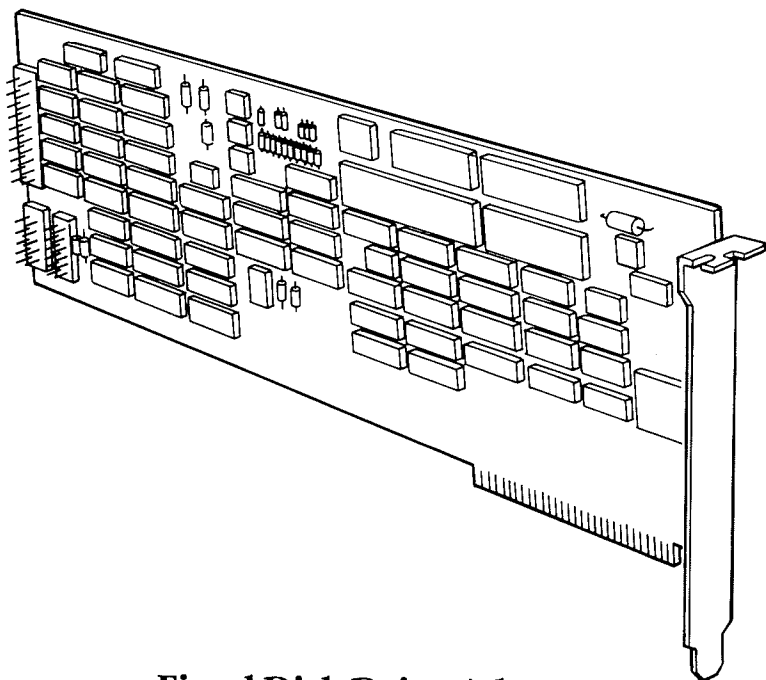
**Color/Graphics Monitor Adapter
(Right View)**



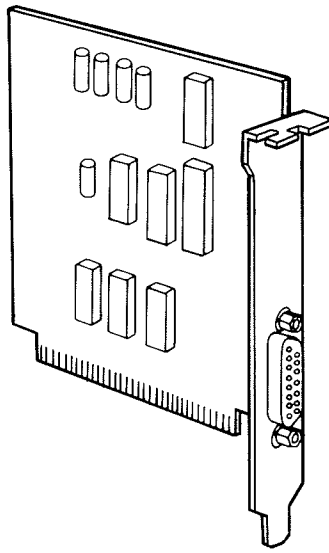
Communications Adapter Cable



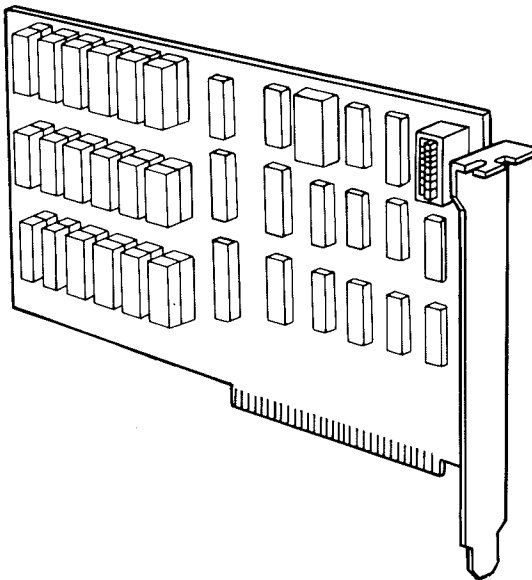
**5 1/4" Diskette Drive Adapter
(Right View)**



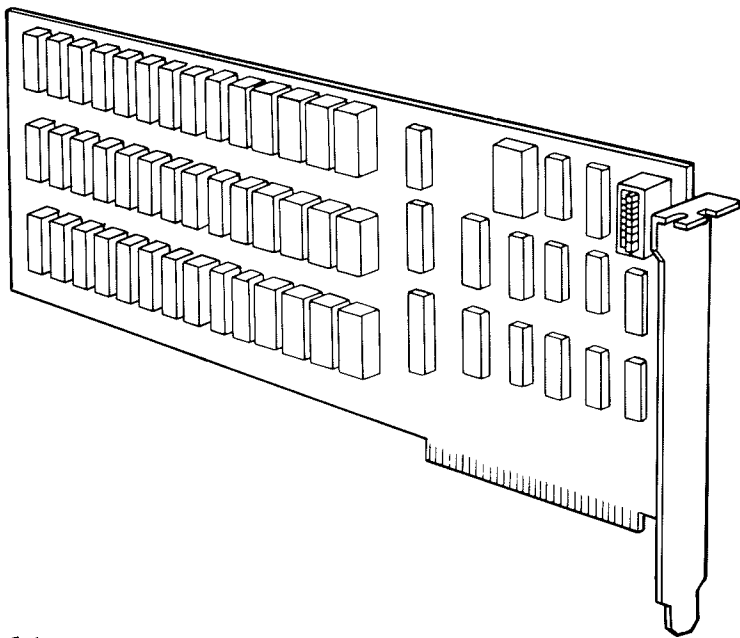
**Fixed Disk Drive Adapter
(Right View)**



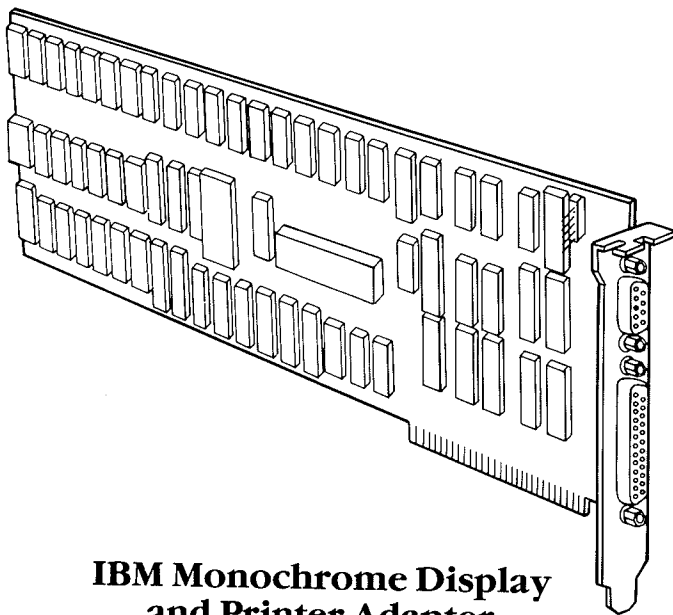
**Game Control Adapter
(Right View)**



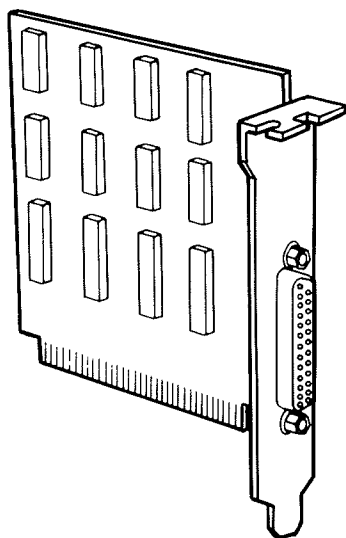
**64 KB Memory Expansion Option
(Right View)**



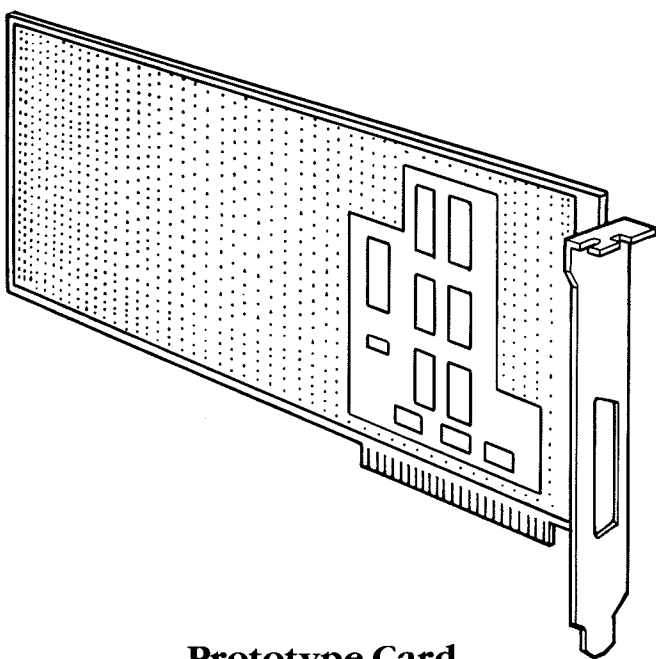
**64/256 KB Memory Expansion Option
(Right View)**



**IBM Monochrome Display
and Printer Adapter
(Right View)**



**Printer Adapter
(Right View)**

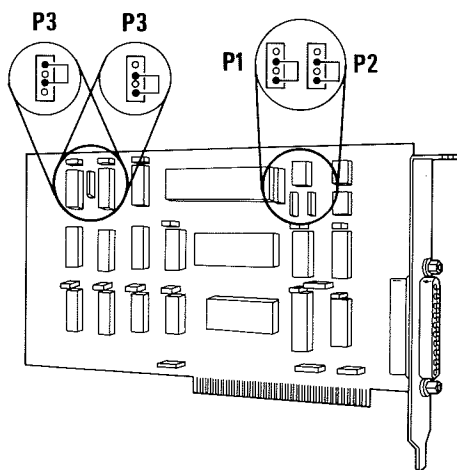


**Prototype Card
(Right View)**

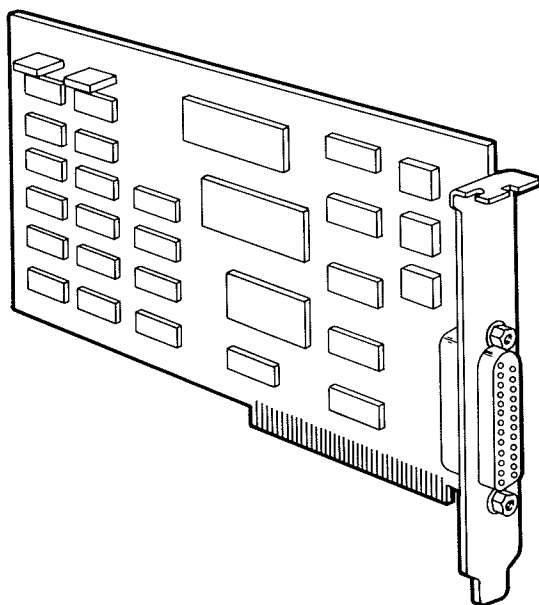
**Jumper Position
for Primary BSC
Adapter**

**Jumper Position
for Alternate BSC
Adapter**

**Connectors P-1 and P-2 must
be jumpered as shown for
correct operation of the
adapter.**



Binary Synchronous Communications Adapter And Adapter Address (Right View)



Synchronous Data Link Control Adapter (Right View)

Notes:

Option Parameters

Monochrome Display and Printer Adapter	May be installed in the system unit only.
5-1/4" Diskette Drive Adapter	
32KB Memory Expansion Option	
64KB Memory Expansion Option	
64/256KB Memory Expansion Option	

BSC Adapter	May be installed in the system unit or expansion unit.
Game Control Adapter	SDLC and Alternate BSC are incompatible.
SDLC Communications Adapter	
Prototype Card	
Printer Adapter	

Color/Graphics Monitor Adapter	May be installed in the system unit. May be installed in the expansion unit only if the monochrome display and printer adapter is installed in the system unit.
---	--

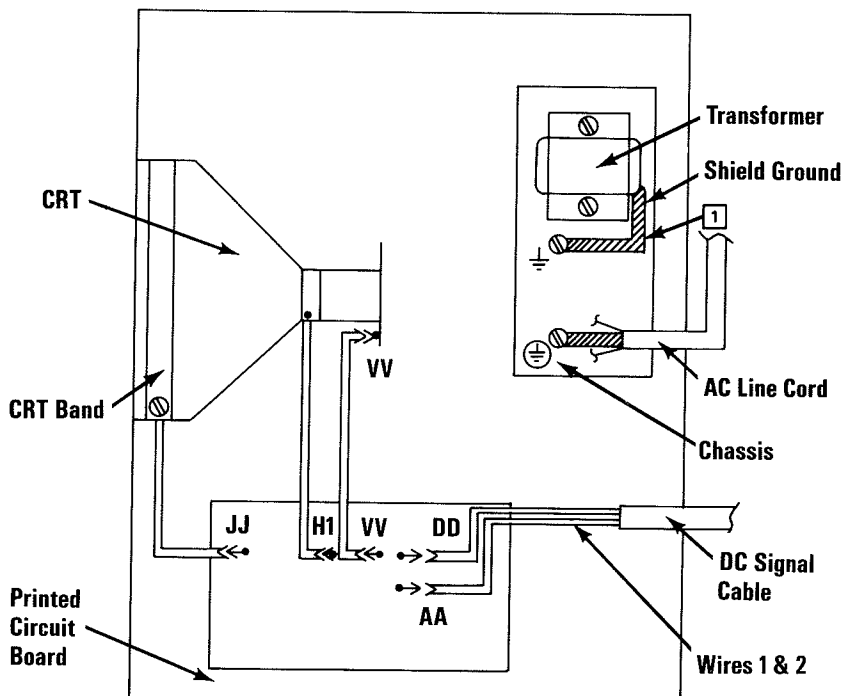
Fixed Disk Drive Adapter	Will be installed in the expansion unit.
------------------------------------	---

Asynchronous Communications Adapter	May be installed in the system unit or expansion unit.
--	--

Notes:







Safety Ground Locations

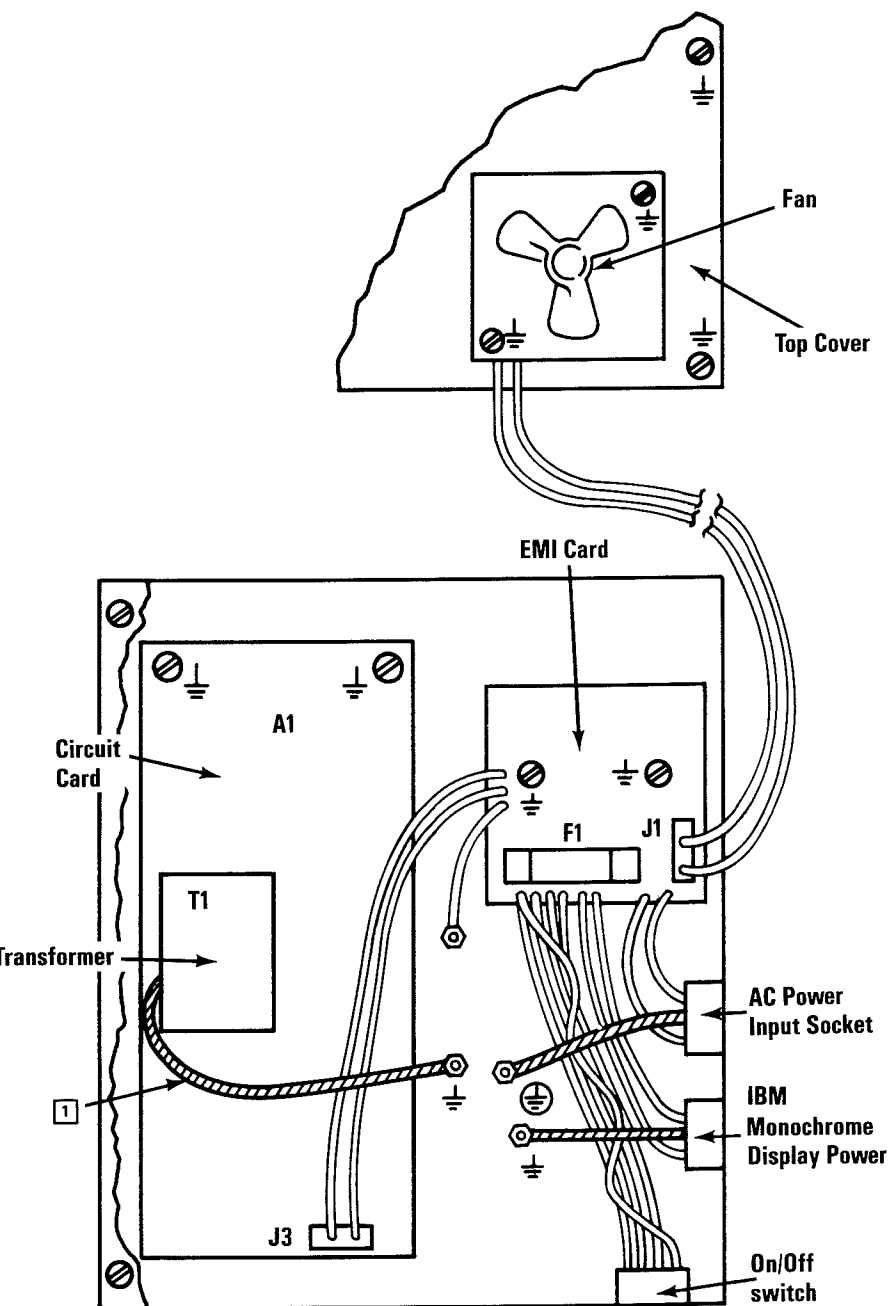
Note: JJ, H1, VV, AA
and DD joined
by printed cir-
cuit lands on
board.



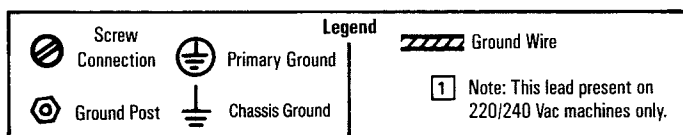
IBM Monochrome Display

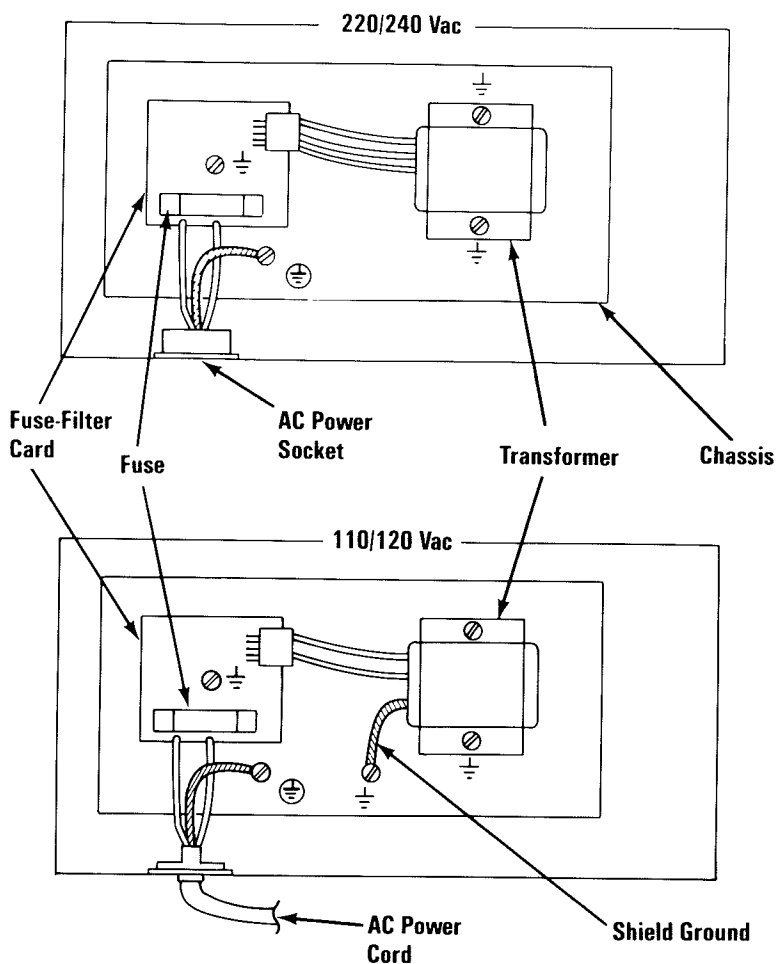
Legend

	Screw Connection		Ground Lead
	Soldered Connection		Primary Ground
	Plugged Connection		Chassis Ground
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1 This lead only present on 220/240 Vac machines. </div>			

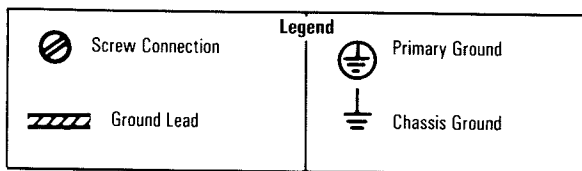


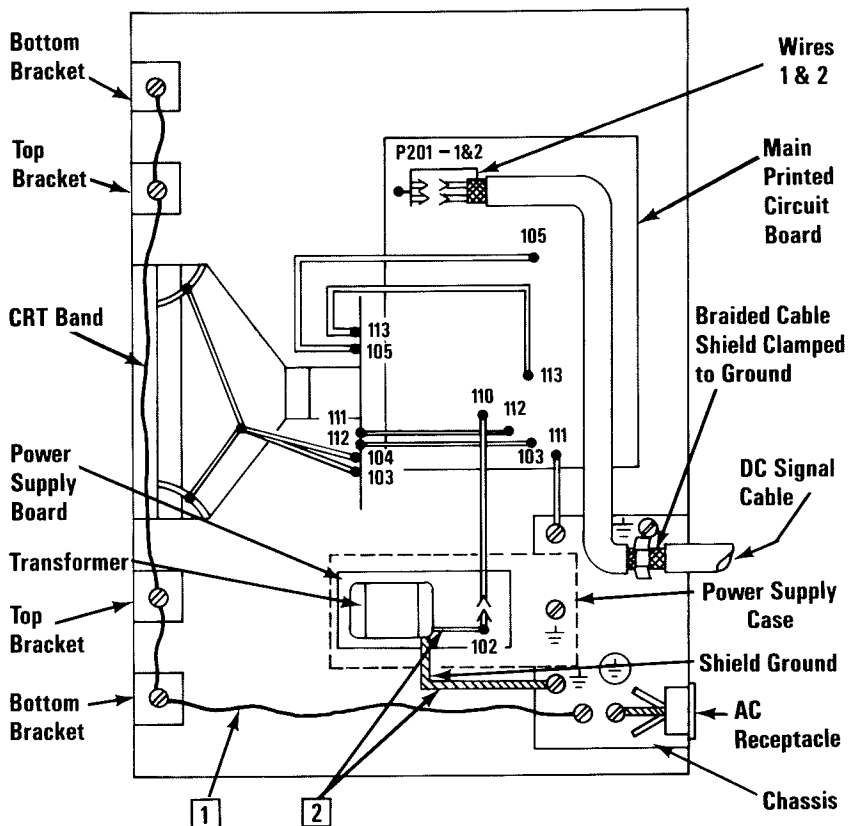
System Unit & Expansion Unit Power Supply











IBM 80 CPS Printer





IBM Color Display

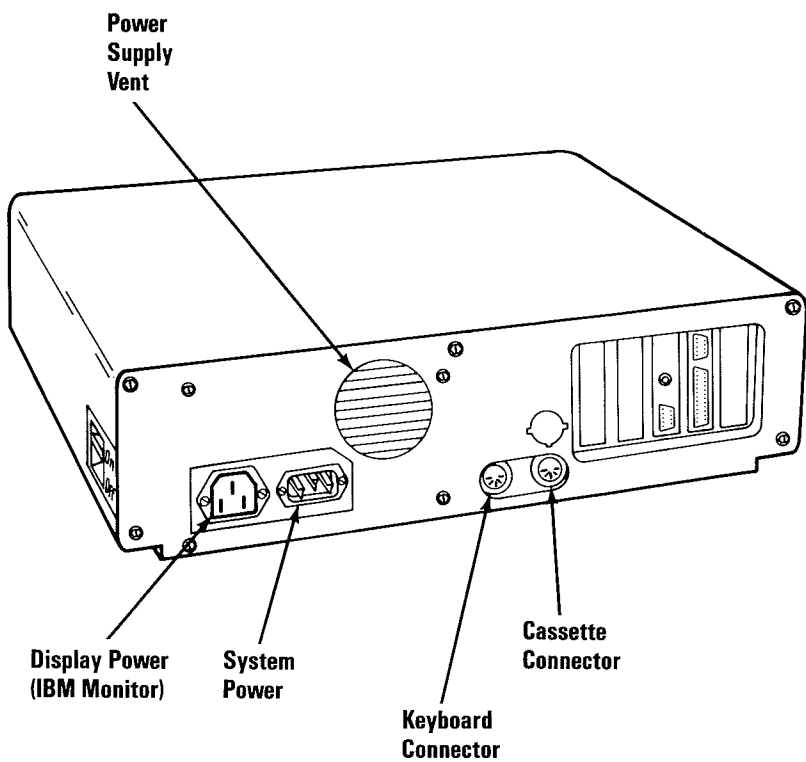
Legend

	Screw Connection		Ground Lead
	Soldered Connection		Primary Ground
	Plugged Connection		Chassis Ground

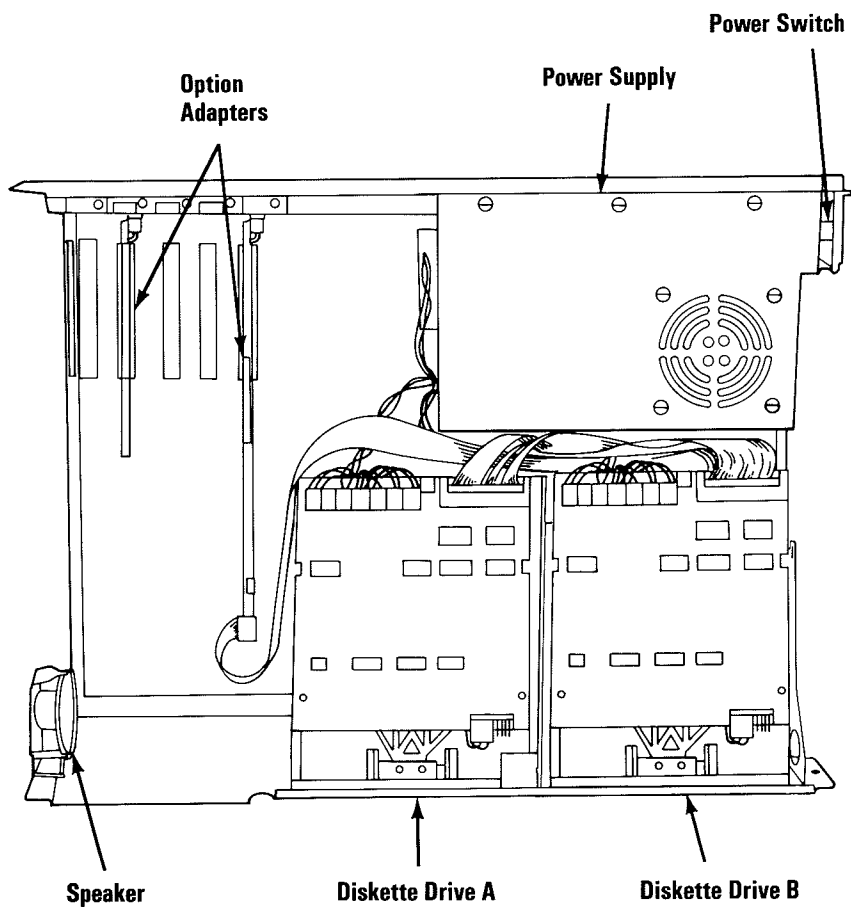
Note: Points 103, 105, 110, 111, 112, 113, and P201-1&2 on main board are joined by printed circuit lands.

- 1** Not present on U.S. only displays
- 2** Present only on model-002 displays

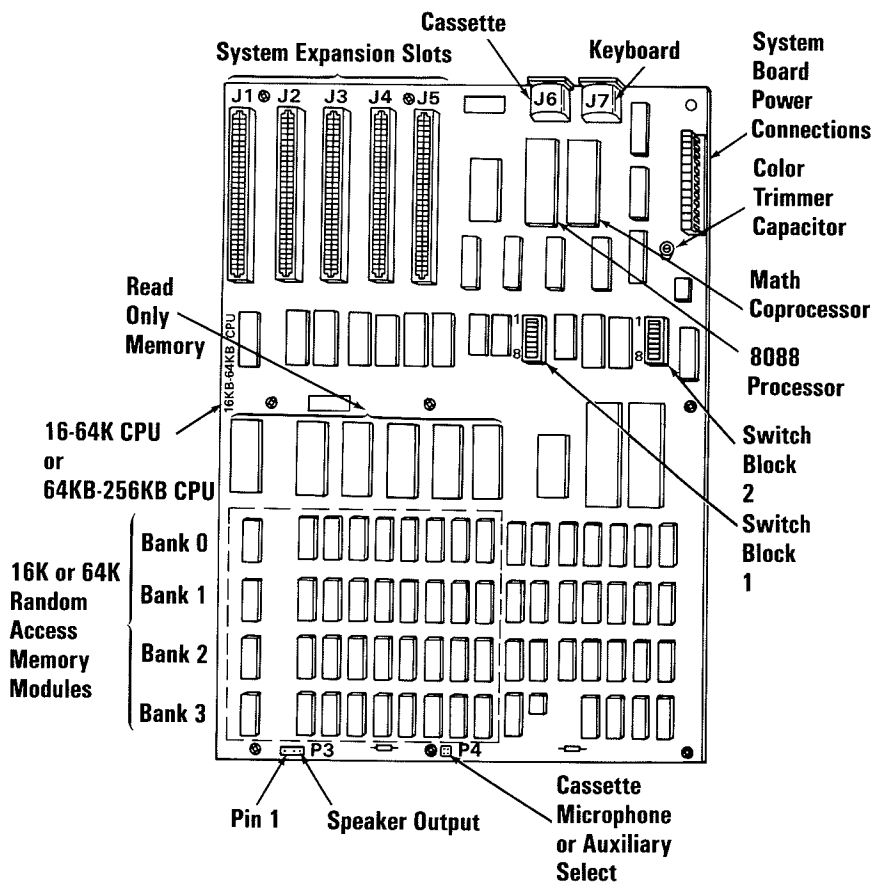
System Unit



**System Unit
(Rear View)**



**System Unit
(Top View)**



**System Board
(Top View)**

Notes:

SECTION 5. REMOVAL/ REPLACEMENT AND ADJUSTMENTS

To use this section, locate the assembly you are servicing in the section index. Each removal, replacement, or adjustment for a field replaceable unit (FRU) is identified by a reference number. Reference numbers are located in the upper right hand corner of each page. Note that they refer to both the removal and replacement procedure for that FRU.

When a step is explained fully by another procedure, you can refer back to that procedure by using the reference number in parenthesis. For example:

1. Set the Power switch to Off.
 2. Remove the system unit cover (5900).
 3. Remove the screw holding the speaker.
- etc.

In the example, step 2 refers you to reference number **5900** for complete instructions on removal of the system unit cover.

Notes:

Diskette Drive Type 1

5100	Cone Assembly	5-7
5105	Cone Lever Arm	5-9
5110	Diskette Drive A	5-11
5115	Diskette Drive B	5-15
5120	Diskette Drive Logic Printed Circuit Board	5-19
5125	Drive Belt	5-23
5130	Drive Motor	5-24
5135	Drive Motor Speed (adjustment)	5-26
5136	Drive Motor Preliminary Speed (adjustment)	5-31
5140	Front Panel	5-35
5145	Latch Assembly	5-37
5150	LED Assembly	5-39
5155	Left Guide	5-40
5160	Right Guide	5-41
5165	Servo Board	5-42
5170	Spindle Assembly	5-43
5180	Write Protect Switch	5-47

Diskette Drive Type 2

5181	Cone Assembly	5-49
5182	Cone Lever Arm	5-51
5183	Diskette Drive A	5-53
5184	Diskette Drive B	5-57
5185	Diskette Drive Logic Printed Circuit Board	5-61
5186	Drive Belt	5-63
5187	Drive Motor	5-64
5188	Drive Motor Speed (adjustment)	5-66
5189	Drive Motor Preliminary Speed (adjustment)	5-71
5190	Front Panel	5-75
5191	Latch Assembly	5-77
5192	LED Assembly	5-79
5193	Left Guide	5-81
5194	Right Guide	5-82
5195	Spindle Assembly	5-83
5196	Write Protect Switch	5-85

Fixed Disk Drive

5200 Drive C	5-87
5210 Drive D	5-93

Display

5300 Monochrome Display	5-99
5350 Color Display	5-100
5360 Color Trimmer Capacitor (adjustment)	5-101
5370 Vertical Hold (adjustment)	5-102
5380 Vertical Size (adjustment)	5-103

Expansion Unit

Cover (See System Unit Cover 5900)	5-187
Power Supply (See System Unit Power Supply 5910) ..	5-189
5410 Expansion Board	5-105

Keyboard

5500 Base	5-109
5510 Keyboard Assembly	5-110

Printer (IBM 80 CPS Matrix or Graphics Printer)

5600 Carriage Belt	5-111
5605 Carriage Drive Assembly	5-118
5615 Control Circuit Card	5-121
5620 Driver Circuit Card	5-128
5625 Control Panel	5-131
5630 Covers	5-132
5635 Forms Feed Knob	5-139
5640 Forms Rack	5-140
5645 Forms Tractor	5-141
5650 Fuse	5-143
5655 Fuse-Filter Card/Power Cord	5-144
5660 Heat Sink/Power Transistor Assembly	5-146
5665 Intermediate Gear	5-148
5670 Left Margin Sensor	5-150
5675 Power Transformer	5-158
5680 Print Head	5-160
5685 Print Mechanism Assembly	5-164
5690 Ribbon Shield	5-168
5695 Safety Shield	5-171

Option Adapters

5800	Option Adapters	5-173
5810	Diskette Drive Adapter	5-176
5820	Fixed Disk Drive Adapter	5-179
5830	64KB Memory Module	5-184

System Unit

5900	Cover	5-187
5910	Power Supply	5-189
5920	Memory Module	5-196
5930	Speaker	5-199
5940	System Board	5-200
5950	Math Coprocessor	5-204
5960	8088 Processor	5-210
5970	Safety Protector	5-214

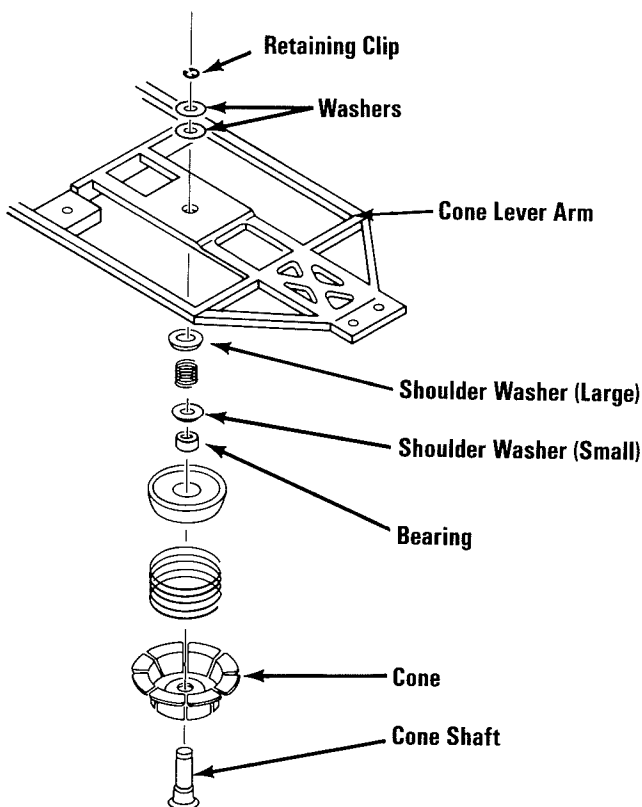
Notes:

Diskette Drive Type 1

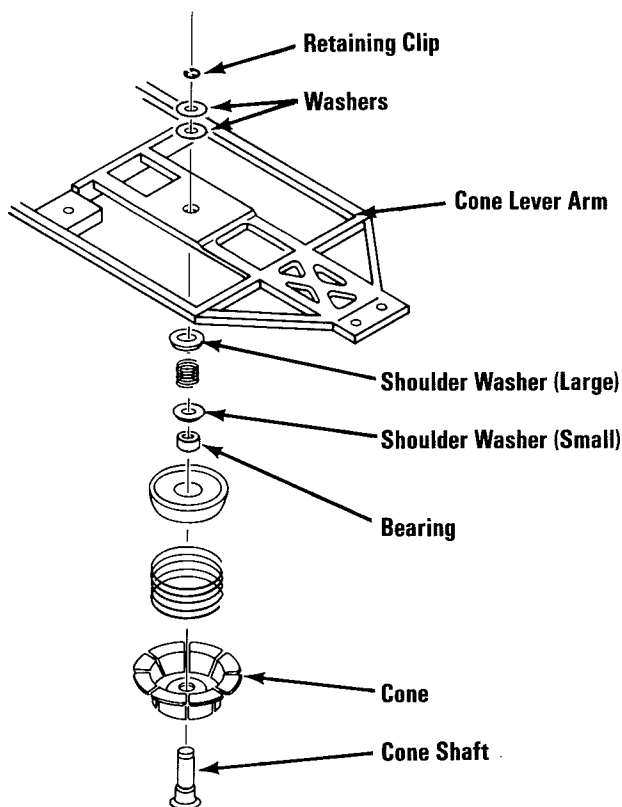
Cone Assembly Removal

5100

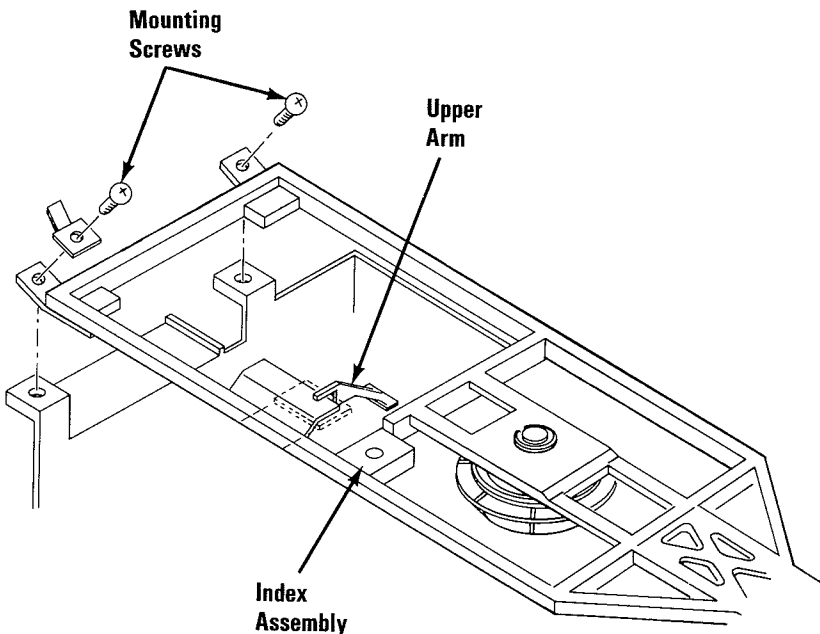
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5120).
7. Remove the cone lever arm (5105).
8. Compress the cone assembly to relieve spring tension and remove the retaining clip from the top of shaft.
9. Release the spring tension and allow the cone assembly to separate from cone lever arm.



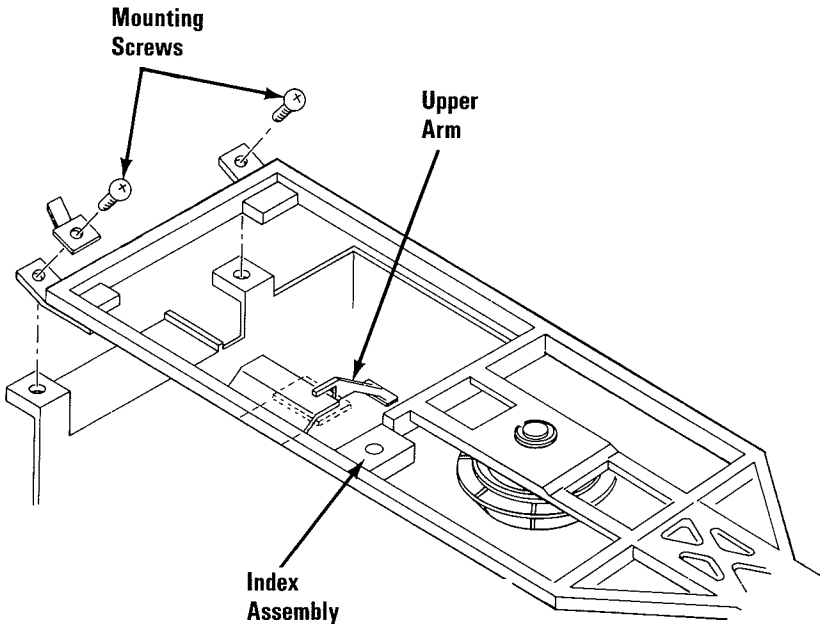
1. Arrange the cone assembly parts as shown in the figure with the shaft through the cone lever arm and the spring compressed.
2. Replace the retaining clip on the shaft.
3. Replace the cone lever arm.
4. Replace the diskette drive's printed circuit board.
5. Replace the system unit's cover.
6. Reconnect all cables.



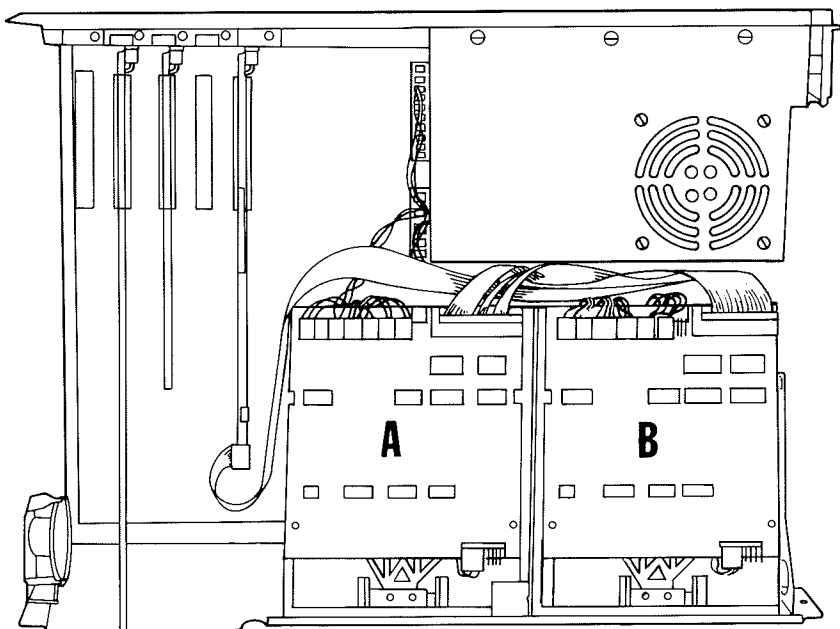
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (**5900**).
6. Remove the diskette drive's printed circuit board (**5120**).
7. Remove the wire tie attaching the index cable to the cone lever assembly.
8. Remove the index assembly.
9. Remove the two mounting screws for the cone lever arm and remove the wire tie(s) at the rear of the cone lever arm.
10. Slide the head carriage to the front of the diskette drive.
11. Release the upper arm by sliding the cone lever arm to the rear of the diskette drive.
12. Lift the cone lever arm out of the diskette drive.



1. Insert the latch assembly in its tracks; move the latch to the front of the diskette drive.
2. Carefully lower the cone lever arm and lift the upper arm over the cone lever arm.
3. Replace the mounting screw(s); do not tighten.
4. Replace the index assembly with the mounting screw.
5. Tie the emitter harness to the cone lever arm.
6. Close the latch assembly to engage the cone and hub.
7. Place the cone lever arm so that the cone assembly is centered over the drive hub; tighten the screw(s).
8. Replace the diskette drive's printed circuit board (5120).
9. Replace the system unit's cover (5900).
10. Reconnect all cable(s).

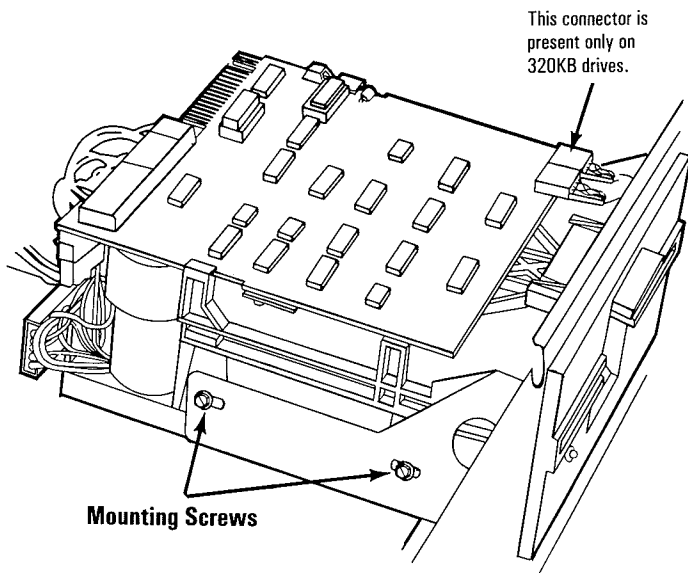


1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (**5900**).
6. Disconnect the signal cable from the diskette drive printed circuit board.

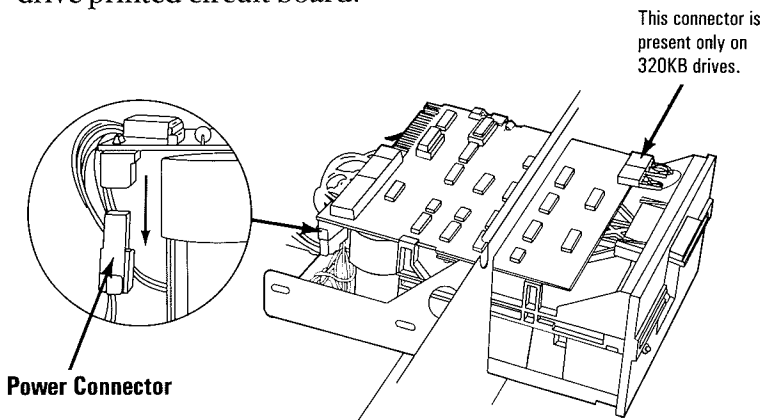


7. Some of the option adapters have to be removed in order to remove the diskette drive mounting screws.

8. Remove the two mounting screws on the left side of diskette drive A.



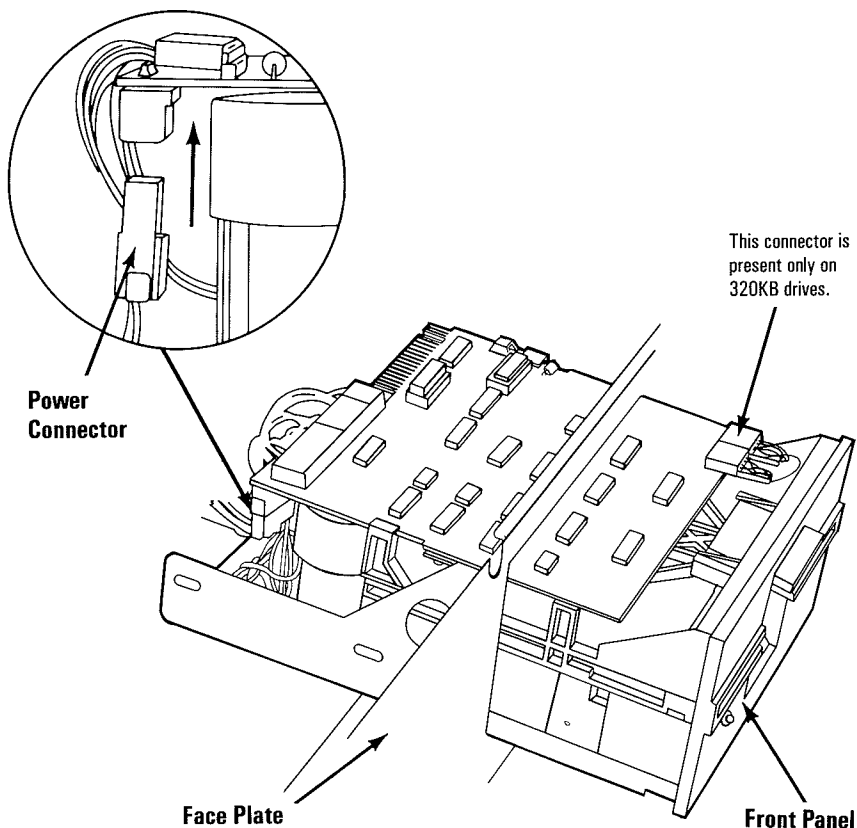
9. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the diskette drive printed circuit board.



(Side View)

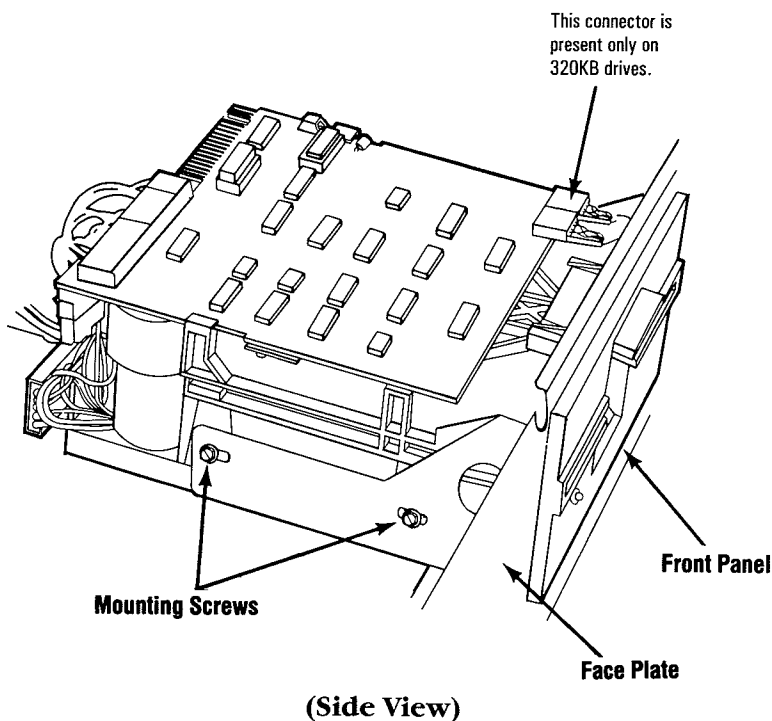
10. Remove the diskette drive from the system unit.

1. Slide diskette drive A in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board.



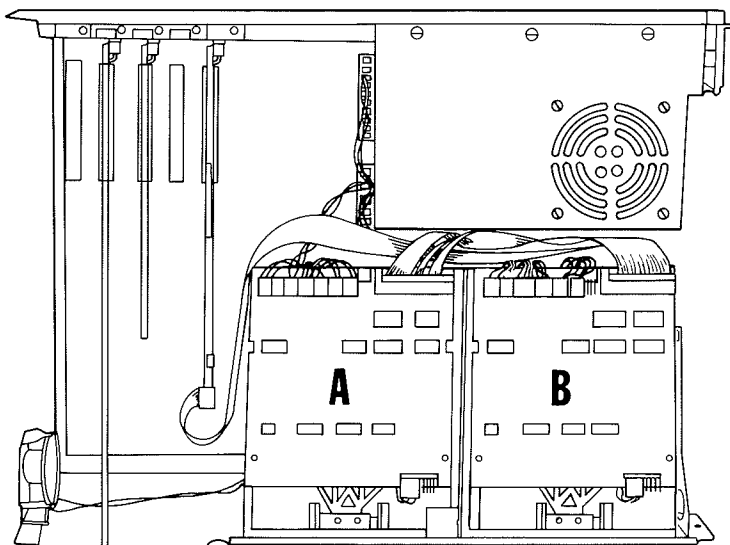
(Side View)

2. Slide diskette drive A in until the face plate is even with the front panel.
3. Route the signal cable between the diskette drive and power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Install the two mounting screws. Adjust the diskette drive in or out for a clearance of .040" between the rear of the front panel and the face plate. Tighten the screws.

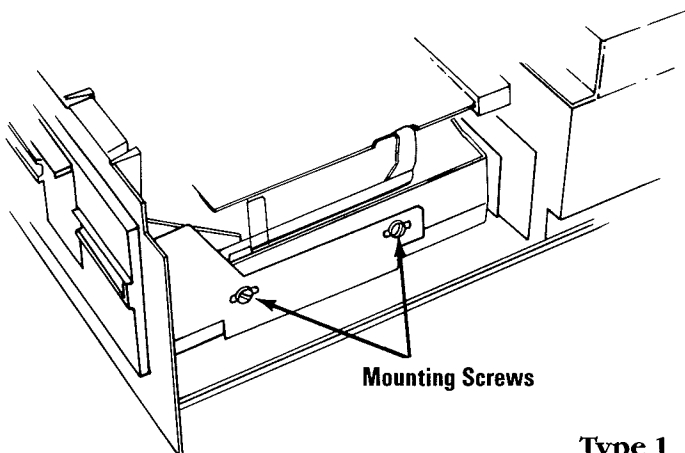


6. Install the option adapter(s) you removed.
7. Install the system unit's cover (5900).
8. Reconnect all cables.

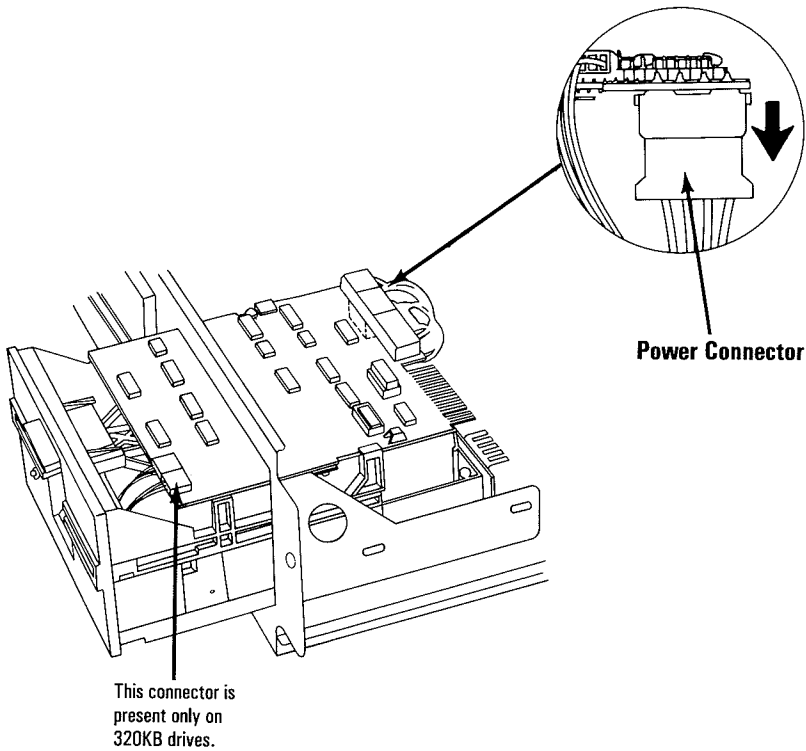
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (**5900**).
6. Disconnect the signal cable from the diskette drive printed circuit board.



7. Remove the two mounting screws on the right side of the diskette drive.

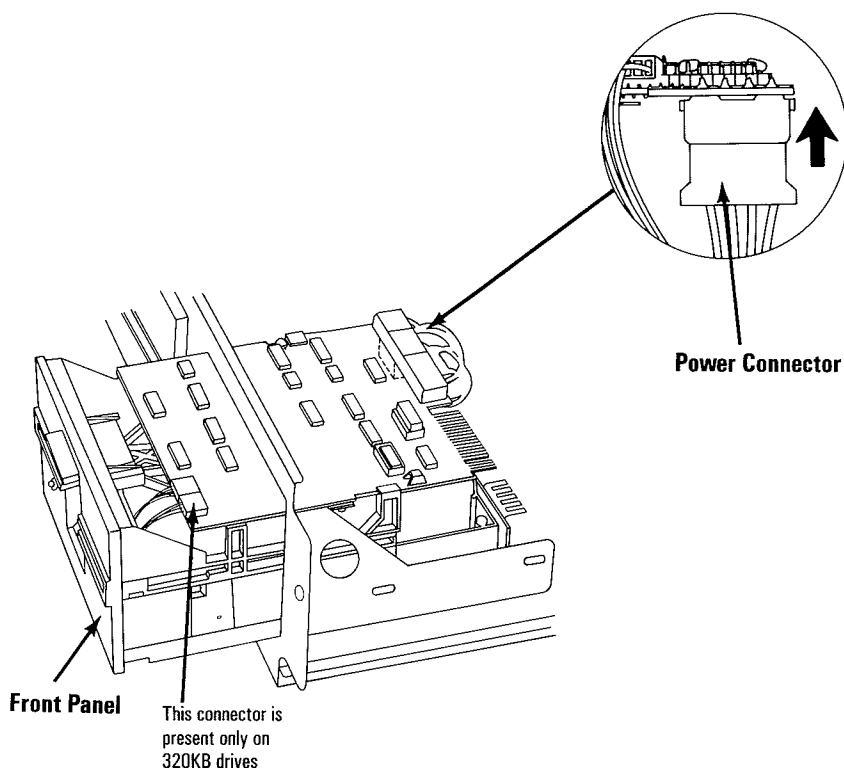


8. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the diskette drive printed circuit board.
9. Remove the diskette drive's signal cable.
10. Remove the diskette drive from the system unit.



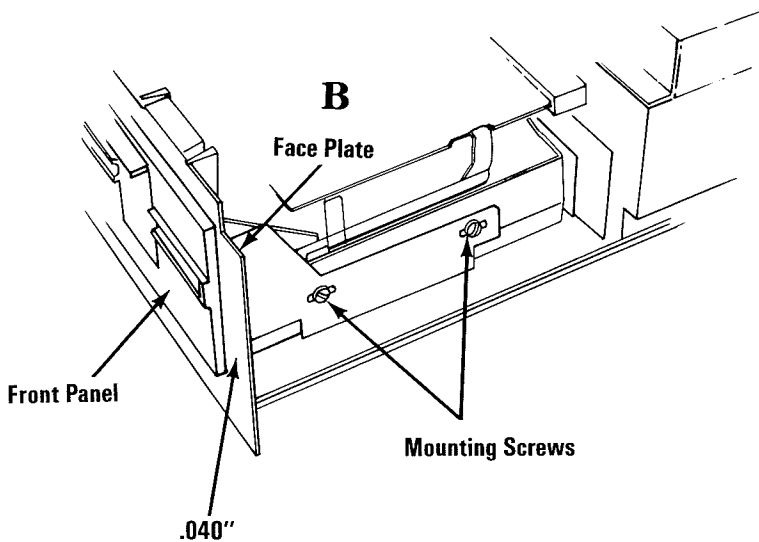
(Side View)

1. Slide the diskette drive in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board.



(Side View)

2. Slide the diskette drive in until the face plate is even with the front panel.
3. Route the signal cable between the diskette drive and power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Install the two mounting screws. Adjust the diskette drive in or out for a clearance of .040" between the rear of the front panel and the face plate. Tighten the screws.



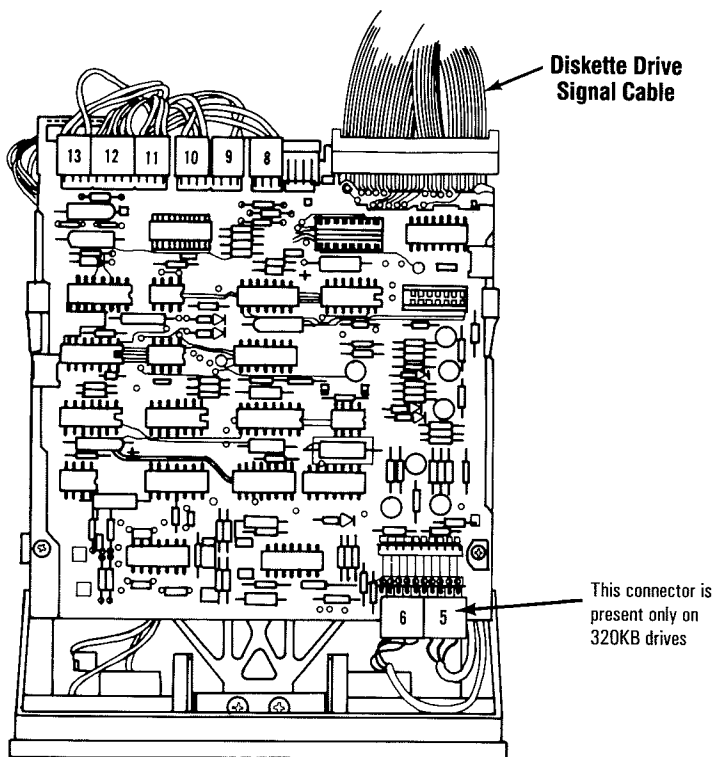
(Side View)

6. Remove the terminating resistor only on drive B.
7. Replace the system unit's cover (5900).
8. Reconnect all cables.

Diskette Drive Logic Printed Circuit Board Removal

5120

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Disconnect connectors 8 through 13 from the left rear of the diskette drive printed circuit board.
7. Disconnect connectors 5 and 6 from the right front of the diskette drive printed circuit board.
8. Disconnect the diskette drive's signal cable from the diskette drive printed circuit board.

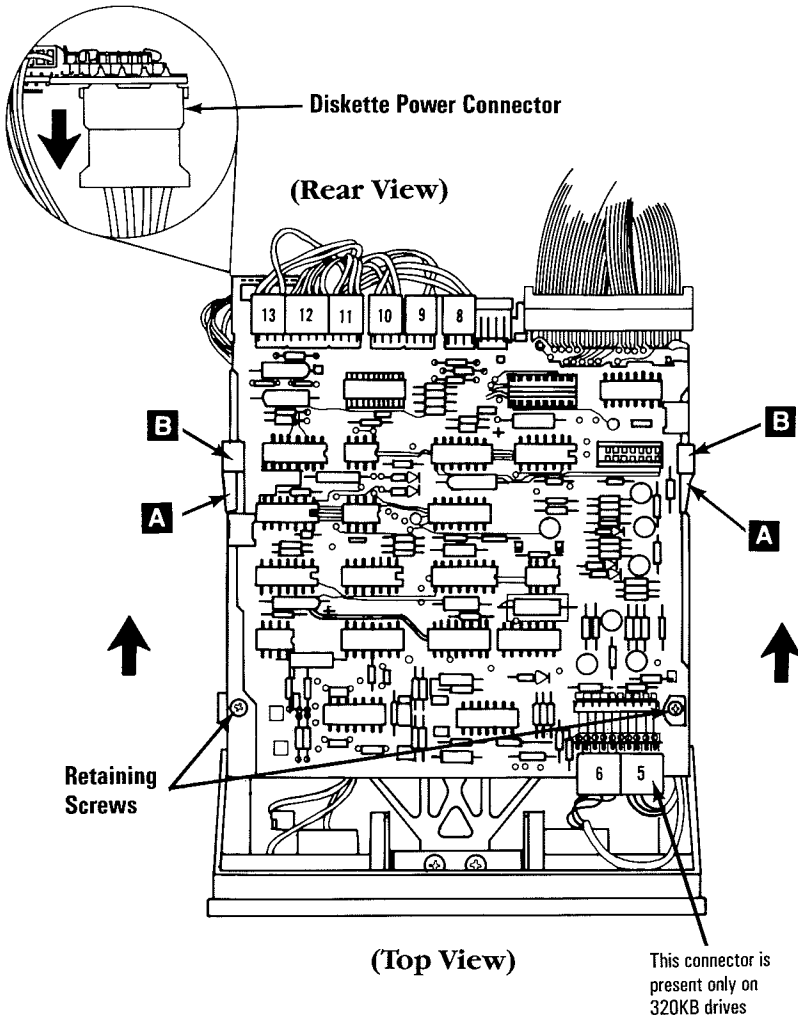


(Top View)

Diskette Drive Logic Printed Circuit Board Removal (cont.)

5120

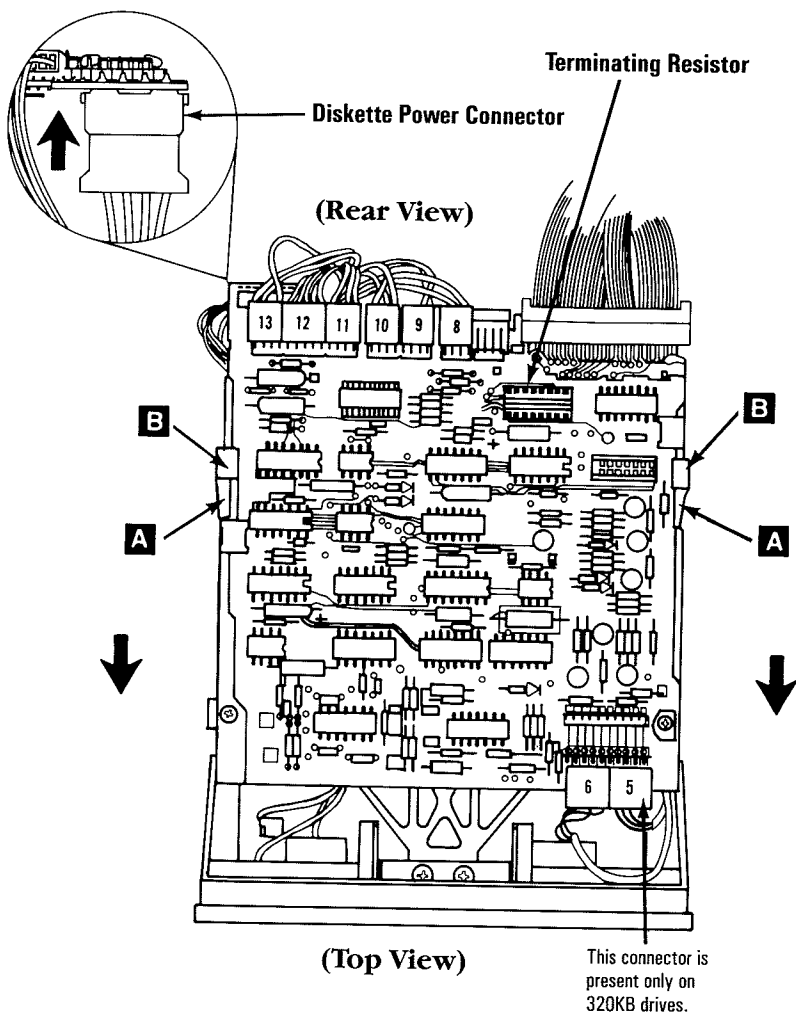
9. Remove the two retaining screws from the top of the diskette drive printed circuit board.
10. Slide the diskette drive printed circuit board to the rear until the notches, **A**, line up with the guide brackets, **B**, then lift the diskette drive printed circuit board from the diskette drive assembly.
11. Disconnect the diskette drive power connector from the left rear of the diskette drive printed circuit board.



Diskette Drive Logic Printed Circuit Board Replacement

5120

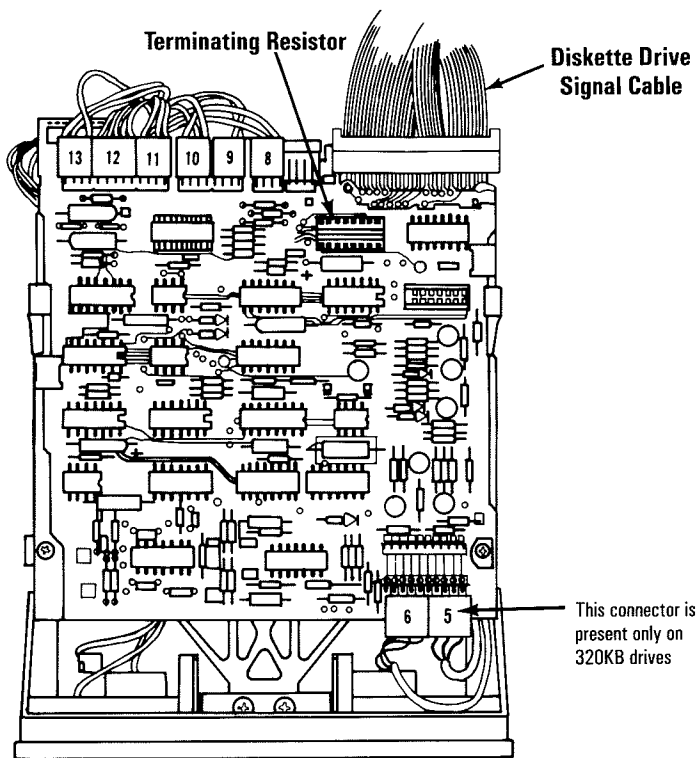
1. Connect the diskette drive's power connector at the left rear of the diskette drive printed circuit board.
2. Align the notches, **A**, on the sides of the diskette drive printed circuit board with the guide brackets, **B**, then lower the diskette drive printed circuit circuit board onto the brackets.
3. Slide the diskette drive printed circuit board toward the front of the diskette drive until the holes in the diskette drive printed circuit board line up with the threaded holes in the frame of the diskette drive.



Diskette Drive Logic Printed Circuit Board Replacement (cont.)

5120

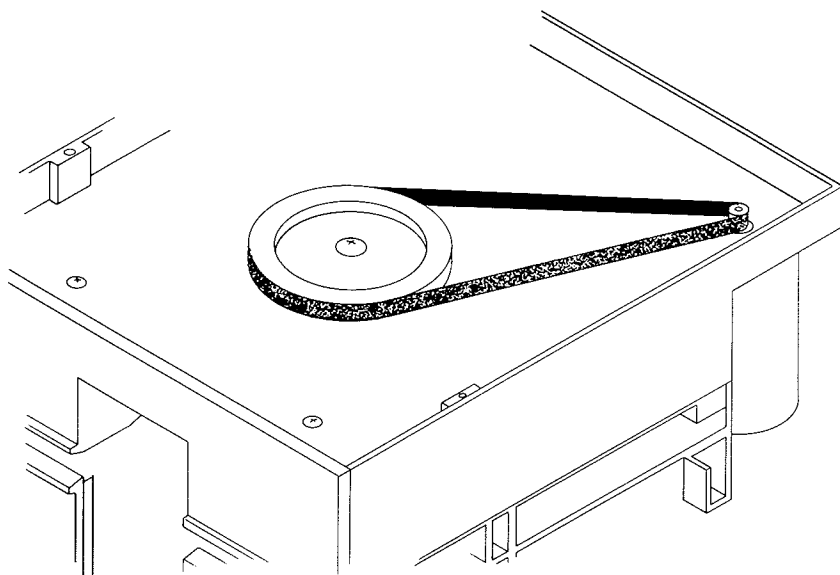
4. Replace the diskette drive printed circuit board retaining screws.
5. Connect connectors 8 through 13 at the left rear of the diskette drive printed circuit board.
6. Connect connectors 5 and 6 at the right front of the diskette drive printed circuit board.
7. Connect the diskette drive's signal cable to the right rear of the diskette drive printed circuit board.



(Top View)

8. Remove the terminating resistor only on drive B.
9. Replace the system unit's cover (5900).
10. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5110) or (5115).
7. Carefully place the diskette drive on a work surface with drive belt and pulleys facing up.
8. Lift the belt off the large pulley, then off the small pulley.

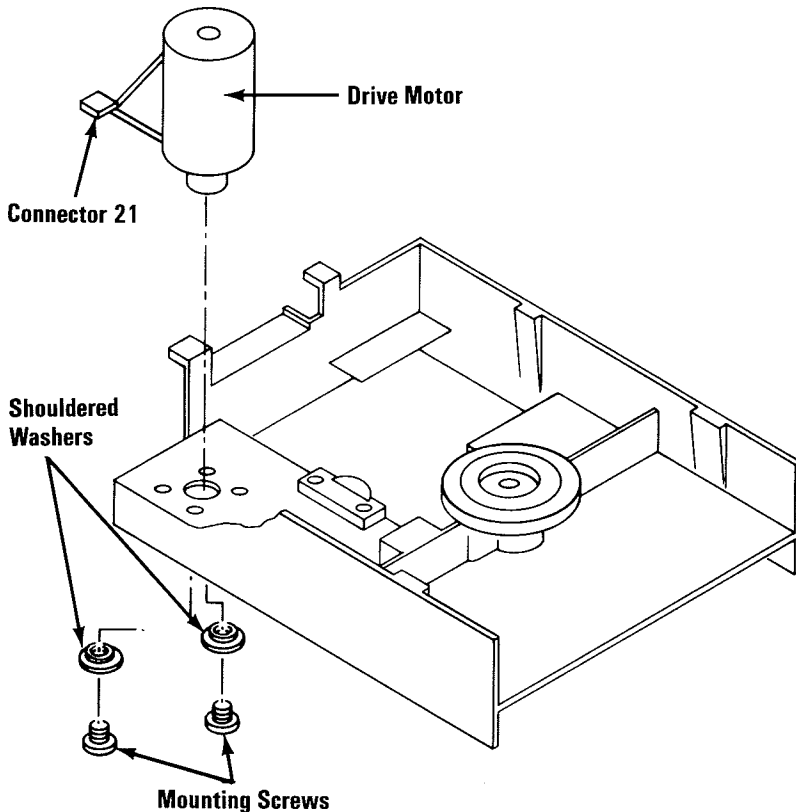


(Bottom View)

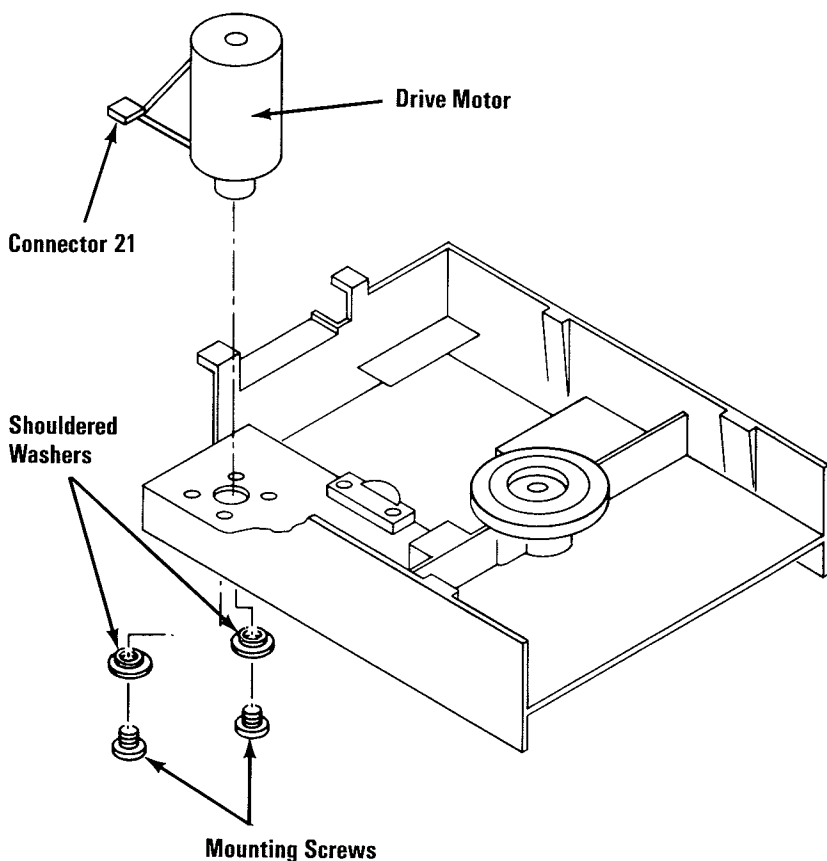
Drive Belt Replacement

1. Place the drive belt around the small pulley (dark, shiny side facing pulleys), then place the belt around the large pulley.
2. Replace the diskette drive (5110) or (5115).
3. Replace the system unit's cover (5900).
4. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5120).
7. Remove the diskette drive (5110) or (5115).
8. Carefully place the diskette drive on a work surface with the drive belt and pulleys facing up.
9. Disconnect connector 21 from the servo board.
10. Remove the drive belt (5125).
11. Remove the drive motor's mounting screws and shouldered washers.
12. Carefully pull the drive motor out of the diskette drive.



1. Place the drive motor in position, with the threaded holes in the motor aligned with the holes in the frame (motor wiring harness should face the rear of the machine).
2. Replace the mounting screws and shouldered washers.
3. Replace the drive belt (**5125**).
4. Connect the drive motor's cable to the servo board at connector 21.
5. Replace the diskette drive (**5110**) or (**5115**).
6. Replace the diskette drive printed circuit board (**5120**).
7. Replace the system unit's cover (**5900**).
8. Reconnect all cables.



1. Insert Advanced Diagnostics diskette.
2. Set the Power switch on the expansion unit (if attached) and the system unit to On.
3. Advance to diagnostic menu 8 (refer to Diagnostic Menu Reference, Section 2).
4. In menu 8, select option 4, SPEED TEST for the diskette drive you are testing. The diskette drive's speed and the adjustment specification appear on the screen.

Note: If you are unable to load the Advanced Diagnostics diskette, or if the Speed Test will not execute, refer to the "Drive Motor Preliminary Speed Adjustment (5136)."

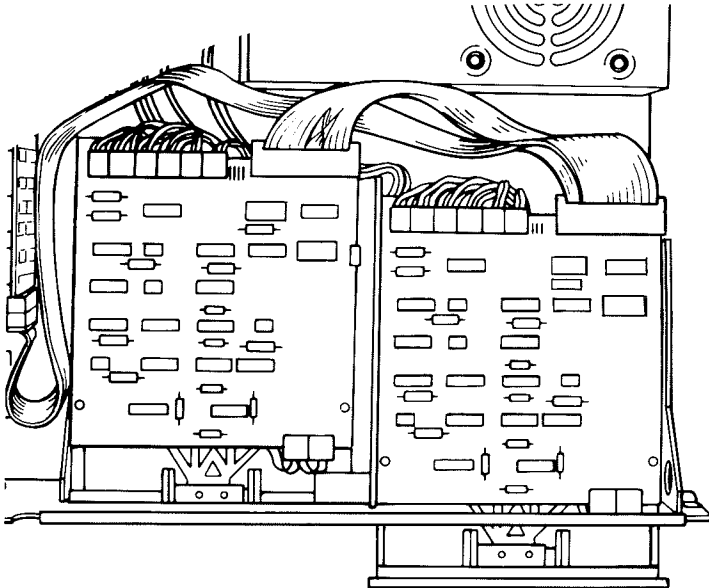
SPEED IS 2000

**ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT**

SPEED IS 1999

ADJUST FOR 1980 TO 2020

5. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
6. Set all external Power switches off (printer, display, etc.).
7. Unplug the system unit's (and expansion unit's) power cord from the wall outlet.
8. Disconnect all cables from the rear of the system unit.
9. Remove the system unit's cover (5900).
10. Remove the two mounting screws on the diskette drive that needs adjusting (5110) or (5115).
11. Slide the diskette drive out of the system unit, approximately two inches.
12. Reconnect all cables.
13. Insert the Advanced Diagnostics diskette.
14. Set the Power switch on the expansion unit (if attached) and the system unit to On.



15. Advance to diagnostic menu 8 (refer to Diagnostic Menu Reference, Section 2).
16. Select option 4, SPEED TEST for the drive you are adjusting. The diskette drive's speed and the adjustment specification appear on the screen.

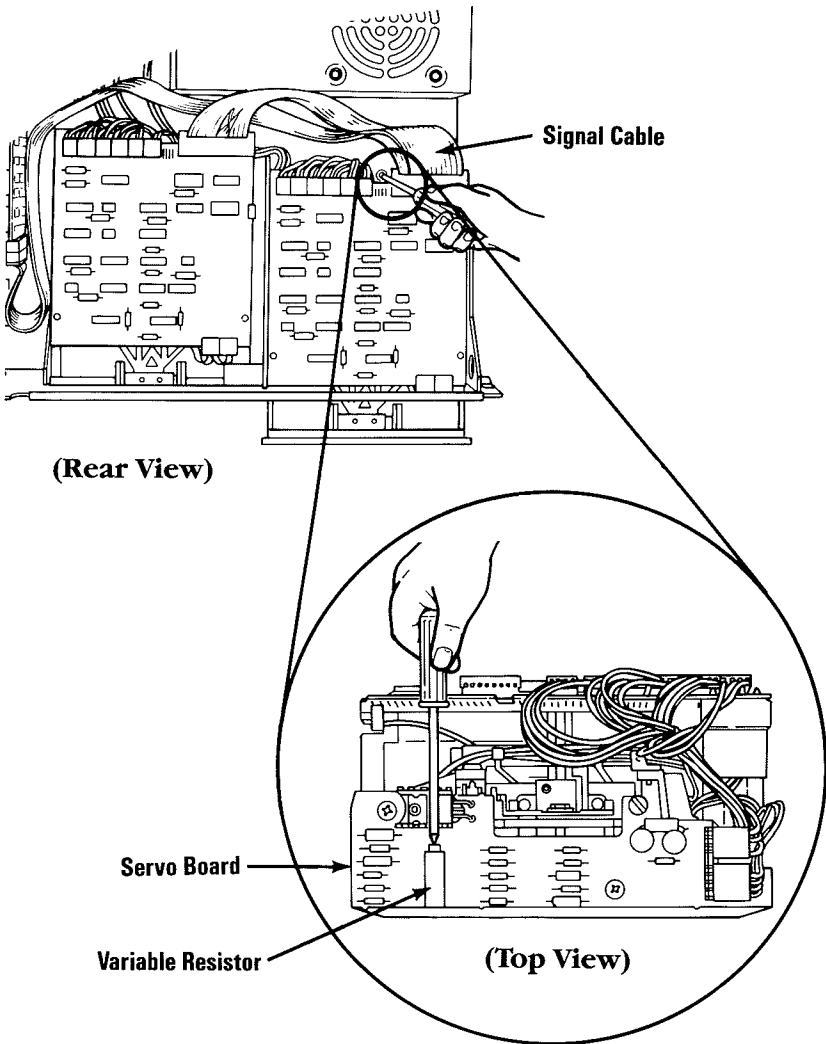
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

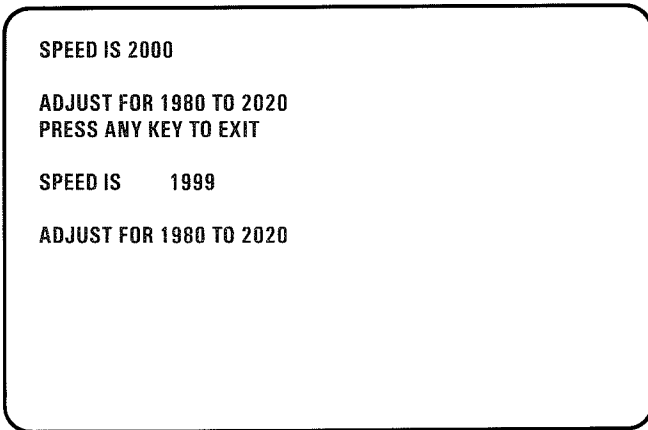
SPEED IS 1999

ADJUST FOR 1980 TO 2020

17. The adjustment for the diskette drive's speed is a variable resistor on the servo board. To adjust the speed, carefully insert an insulated screwdriver down past the left end of the diskette drive's signal cable, to the adjusting screw on the top of the variable resistor.



18. Turn the screw until the speed shown on the screen is within the required specifications.



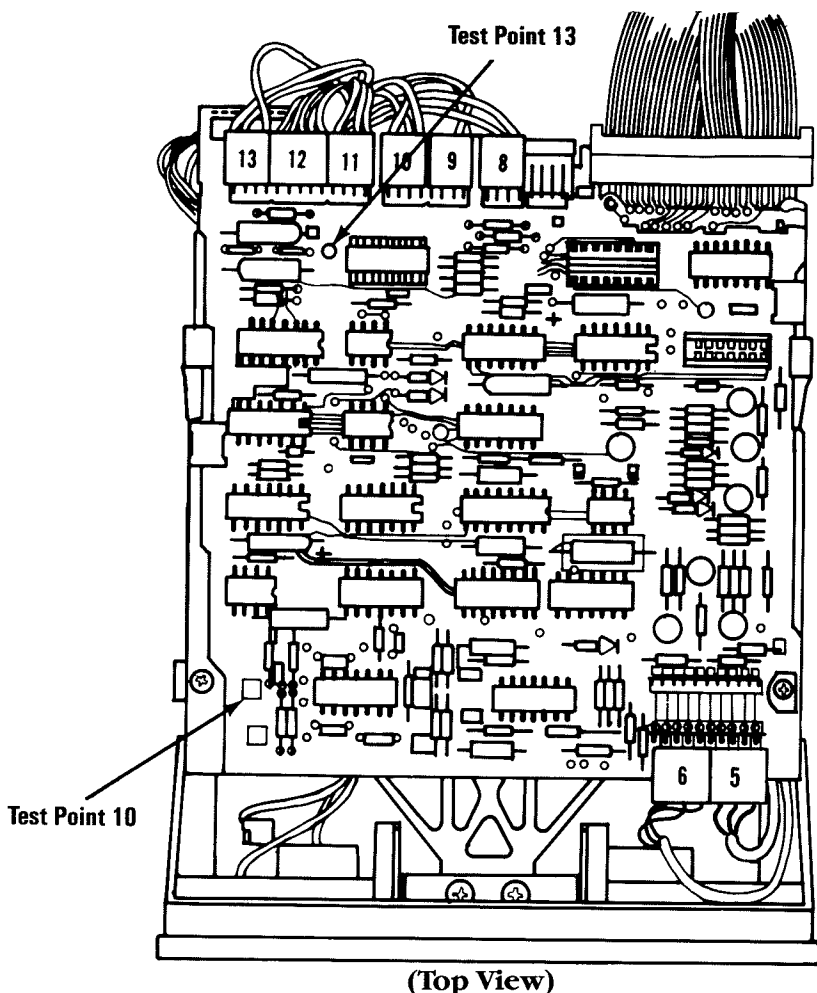
19. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
20. Set all external Power switches off (printer, display, etc.).
21. Unplug the system unit's (and expansion unit's) power cord from the wall outlet.
22. Disconnect all cables from the rear of the system unit.
23. Reinstall diskette drive (5110) or (5115).
24. Replace the system unit's cover (5900).
25. Reconnect all cables.

Drive Motor Preliminary Speed Adjustment

5136

Use this procedure for diskette drive A or B, or both, when the Advanced Diagnostics diskette will not load, or the Speed Test will not execute. You will need a fluorescent light for this adjustment.

1. Remove the diskette drive (5110) or (5115).



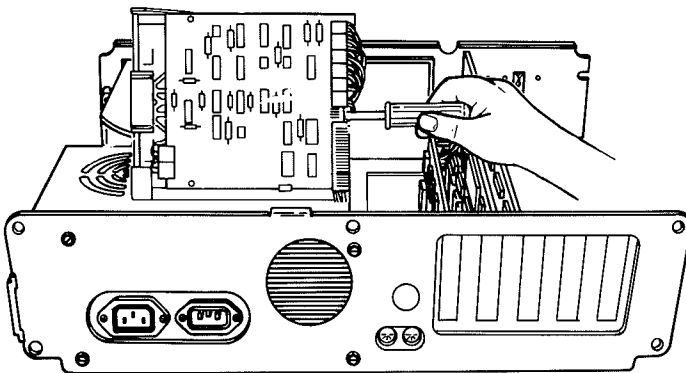
(Top View)

2. Insert a scratch diskette into the diskette drive.
3. Connect a jumper between test points 10 and 13 on the diskette drive printed circuit board.

Drive Motor Preliminary Speed Adjustment (cont.)

5136

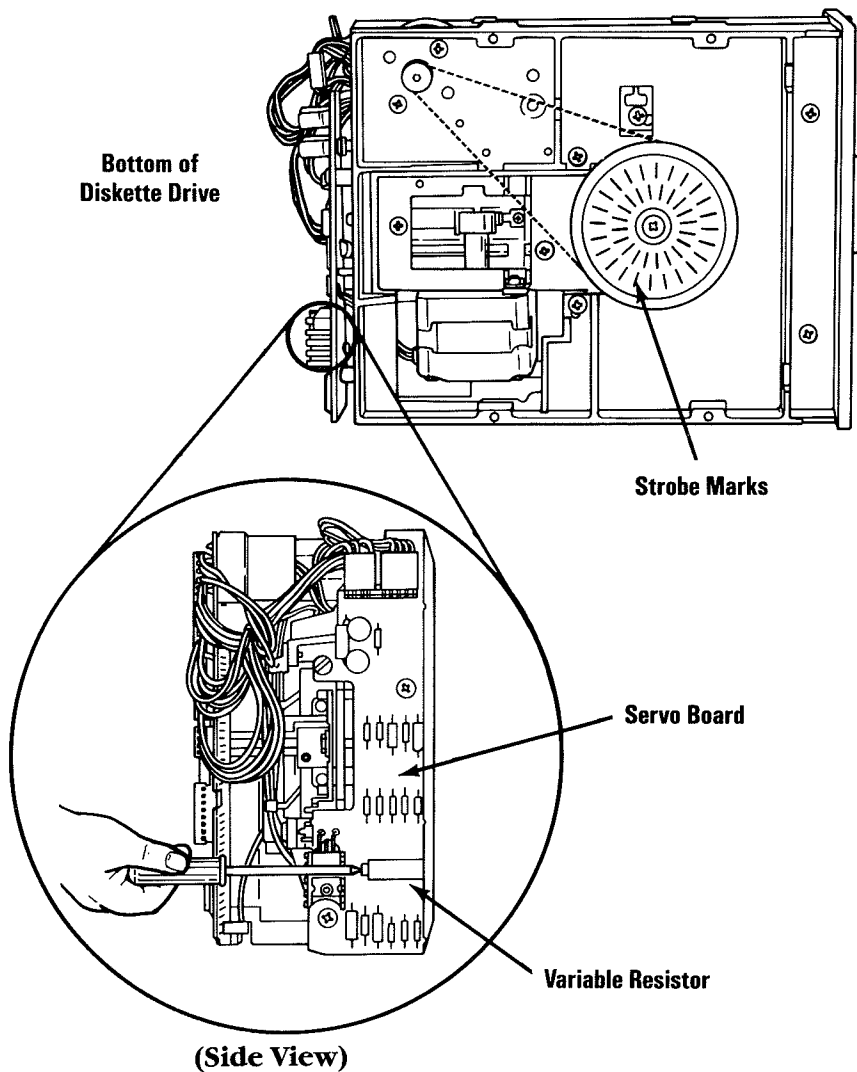
4. Place the diskette drive (left side up) on the system unit's power supply as shown below.
5. Plug the power connector into the diskette drive printed circuit board, and leave the signal cable unplugged.
6. Plug the system unit's power cord into the system unit, then into the wall outlet.
7. Set the system unit's Power switch to On.



(Rear View)

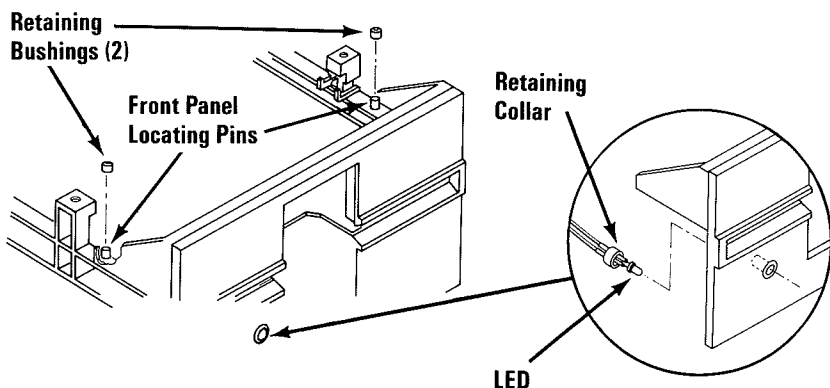
8. Observe the black strobe marks on the outer ring of the drive pulley and adjust the variable resistor on the servo board until the strobe marks appear to stand still, in fluorescent light.

Note: The outer ring of strobe marks is for 60 hertz, and the inner ring is for 50 hertz.

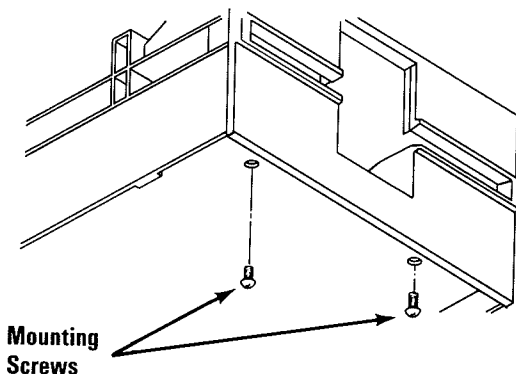


9. Set the system unit's Power switch to Off.
10. Disconnect the system unit's power cord from the wall outlet.
11. Disconnect the system unit's power cord from the rear of the system unit.
12. Install the diskette drive **(5110)** or **(5115)**.
13. Use "Drive Motor Speed Adjustment **(5135)**" to verify the speed is within specification. Adjust if necessary.
14. Replace the system unit's cover **(5900)**.
15. Reconnect all cables.

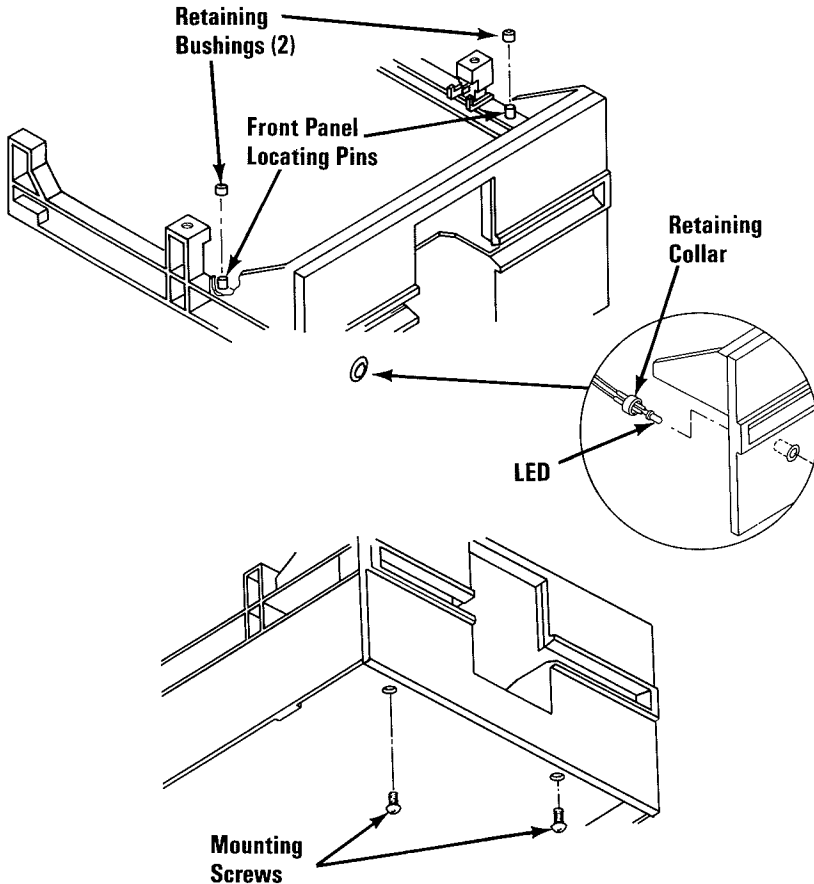
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5110) or (5115).
7. Remove the diskette drive printed circuit board (5120).
8. Remove the retaining collar that holds the LED assembly to the front panel.
9. Remove the LED assembly from the front panel.
10. Remove the retaining bushings.



11. Carefully place the diskette drive on its side and remove the front panel mounting screws.
12. Remove the front panel from the diskette drive.

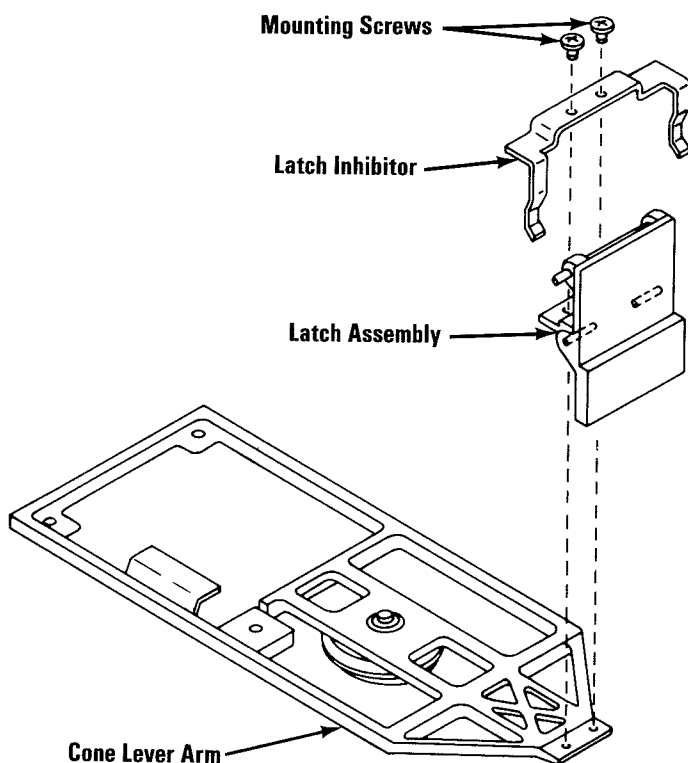


1. Insert the front panel's latch in its tracks and set the panel in place on the locating pins.
2. Install the two mounting screws that attach the front panel to the diskette drive.
3. Push the LED assembly into the grommet.
4. Push the retaining collar over the back of the LED grommet.
5. Replace the retaining bushings.

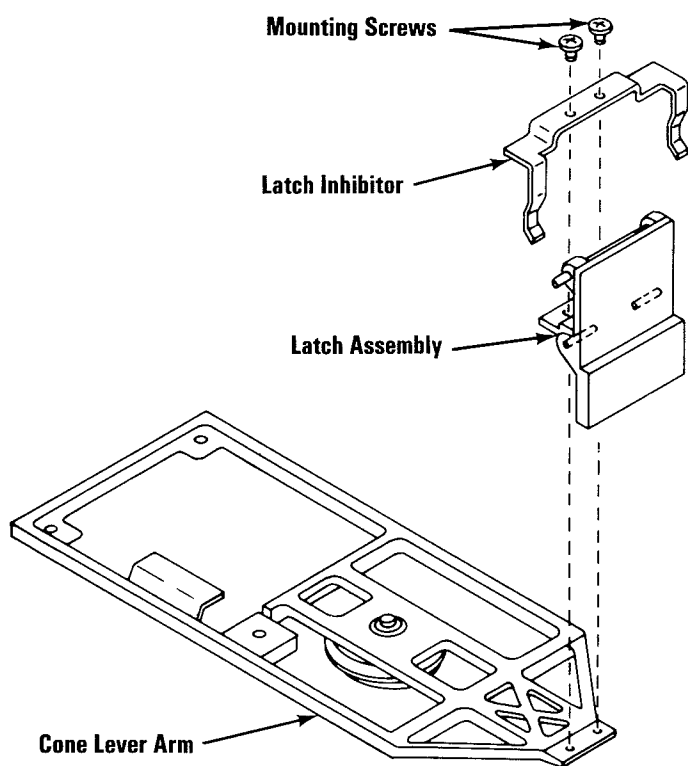


6. Replace the diskette drive printed circuit board (5120).
7. Replace the system unit's cover (5900).
8. Reconnect all cables.

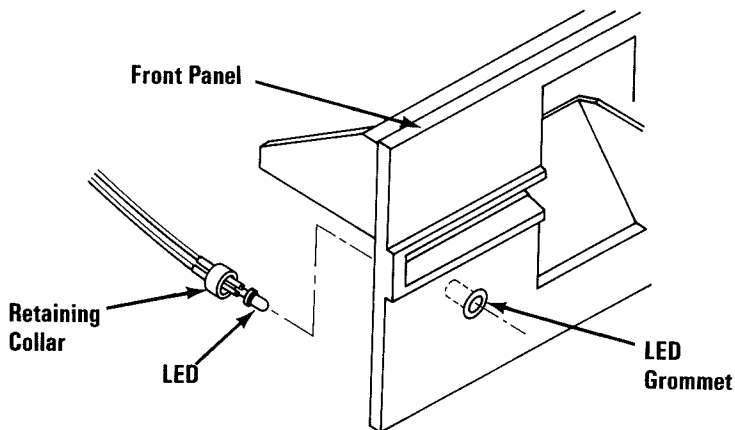
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches Off (printer, TV., etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove diskette drive printed circuit board (5120).
7. Close the latch and lightly hold the cone lever arm down while removing the latch mounting screws.
8. Lift the latch inhibitor out of the diskette drive.
9. Slide the latch assembly out through the slots in the rear of the front panel.



1. Slide the latch assembly into the slots at the rear of the front panel.
2. Lightly hold the cone lever arm down, and align the two mounting holes in the latch assembly with the holes in the front of the cone lever arm.
3. Align the latch inhibitor with the two holes in the latch assembly and replace the screws; do not tighten the screws.
4. Align the latch with the front panel, and align the latch inhibitor so it will just touch a fully inserted diskette; then tighten the screws.
5. Replace the diskette drive printed circuit board (5120).
6. Replace the system unit's cover (5900).
7. Reconnect all cables.



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive.
7. Remove the diskette drive printed circuit board.
8. Remove the retaining bushings.
9. Carefully place the diskette drive on its side and remove the front panel mounting screws.
10. Remove the front panel from the diskette drive.
11. Remove the retaining collar that holds the LED assembly to the front panel.
12. Remove the LED assembly from the front panel.

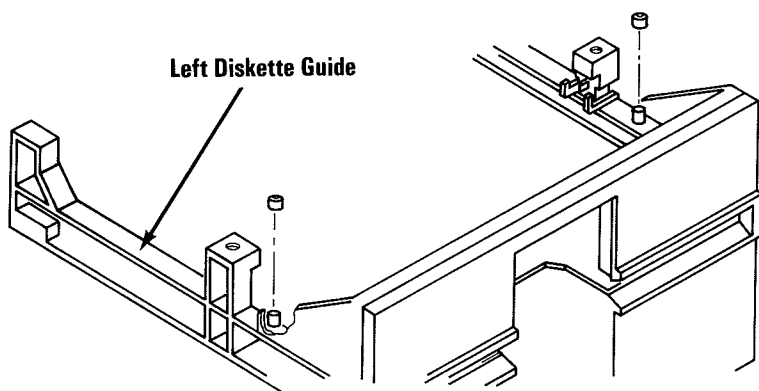


LED Assembly Replacement

5150

1. Push the LED assembly into the grommet.
2. Push the retaining collar over the back of the LED grommet.
3. Insert the front panel's latch in its tracks and set the panel in place on the locating pins.
4. Install the two mounting screws that attach the front panel.
5. Replace the diskette drive printed circuit board (5120).
6. Replace the system unit's cover (5900).
7. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive's printed circuit board (5120).
7. Remove the front panel (5140).
8. Remove the retaining bushings.
9. Slide the blade of a screw driver between the frame and the rear of the left guide, carefully pry the left guide from the frame.

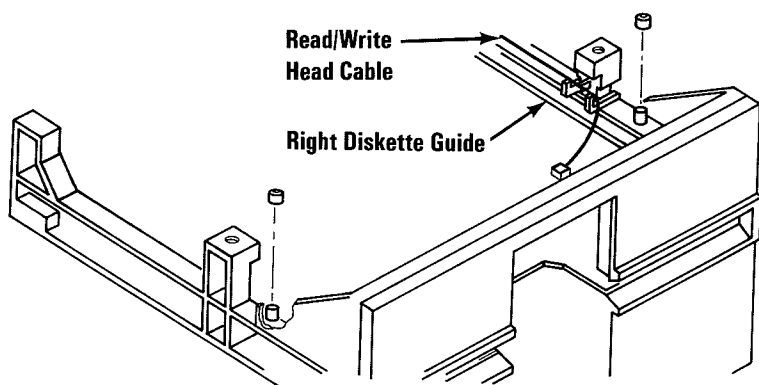


Left Diskette Guide Replacement

5155

1. Align the pins on the left guide with the mounting holes on the top of the left side frame, then lower the guide onto the frame.
2. Replace the front panel (5140).
3. Replace the diskette drive printed circuit board (5120).
4. Replace the system unit's cover (5900).
5. Reconnect all cables.

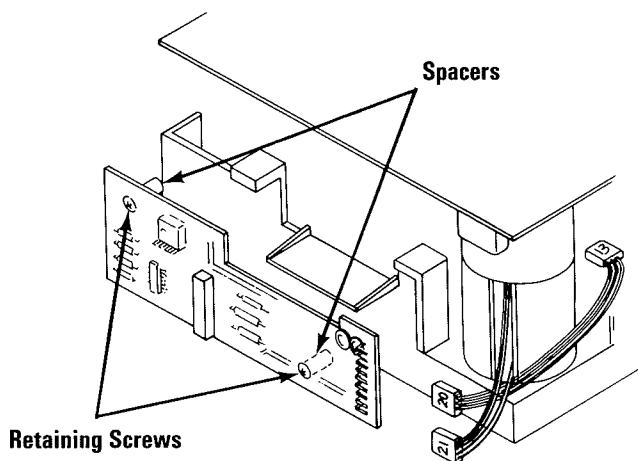
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches Off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive's printed circuit board (5120).
7. Remove the front panel (5140).
8. Remove the read/write head cable from the brackets on the right diskette guide.
9. Remove the retaining bushings.
10. Slide the blade of a screw driver between the frame and the rear of the right guide, carefully pry the right guide from the frame.



Right Diskette Guide Replacement 5160

1. Align the pins on the right guide with the mounting holes on the top of the right side frame, then lower the guide onto the frame.
2. Place the read/write head cable through the brackets on the right guide.
3. Replace the front panel (5140).
4. Replace the diskette drive printed circuit board (5120).
5. Replace the system unit's cover (5900).
6. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5110) or (5115).
7. Disconnect connectors 20 and 21 from the servo board.
8. Remove the servo board's retaining screws and lift the servo board from the diskette drive. Do not lose the spacers between the servo board and the frame when removing the board.



Servo Board Replacement

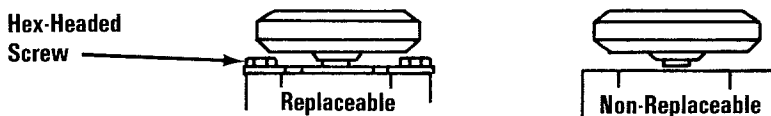
1. Place the servo board in position at the rear of the diskette drive.
2. Insert the retaining screws while holding the spacers in place between the servo board and the frame.
3. Connect connectors 20 and 21 to the servo board.
4. Replace the diskette drive (5110) or (5115).
5. Replace the system unit's cover (5900).
6. Reconnect all cables.

Spindle assemblies are installed two ways in the diskette drives.

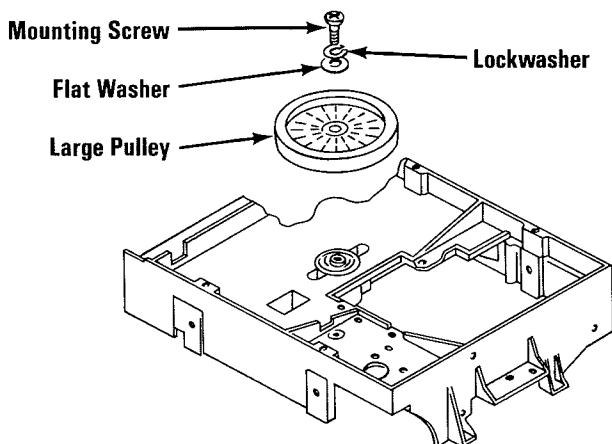
The assembly installed with hex-headed screws and retainer can be replaced.

The assembly installed by bonding cannot be replaced.

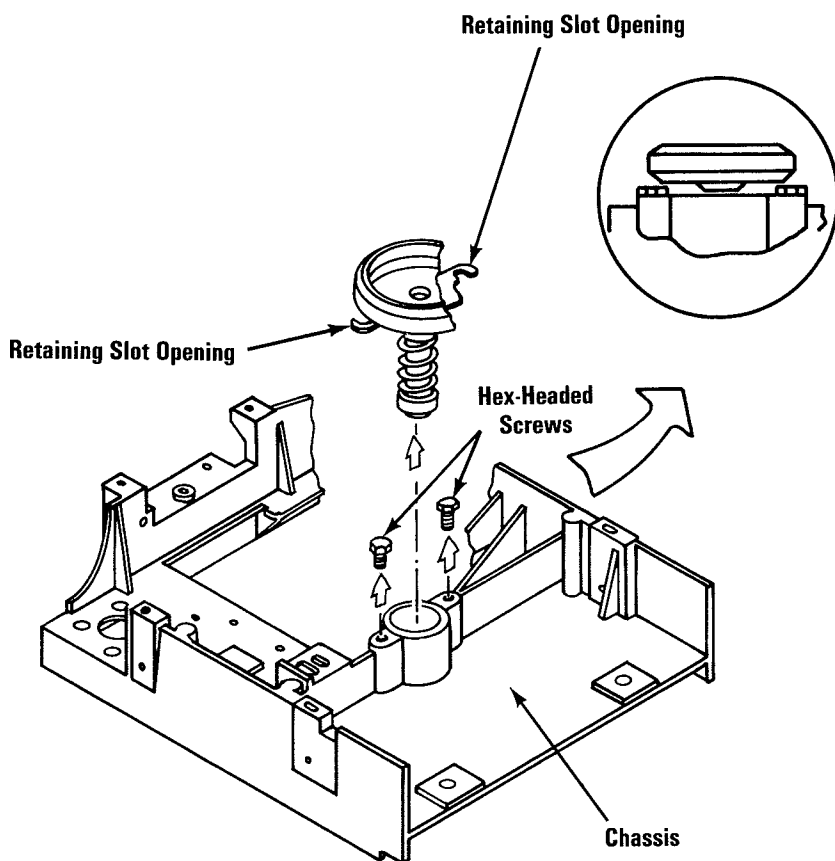
Look through the latch opening of the diskette drive and find the spindle hub. If you have the hex-headed screws under the spindle hub, continue with the removal/replacement procedure. If you do not have the hex-headed screws under the spindle hub replace the diskette drive assembly.



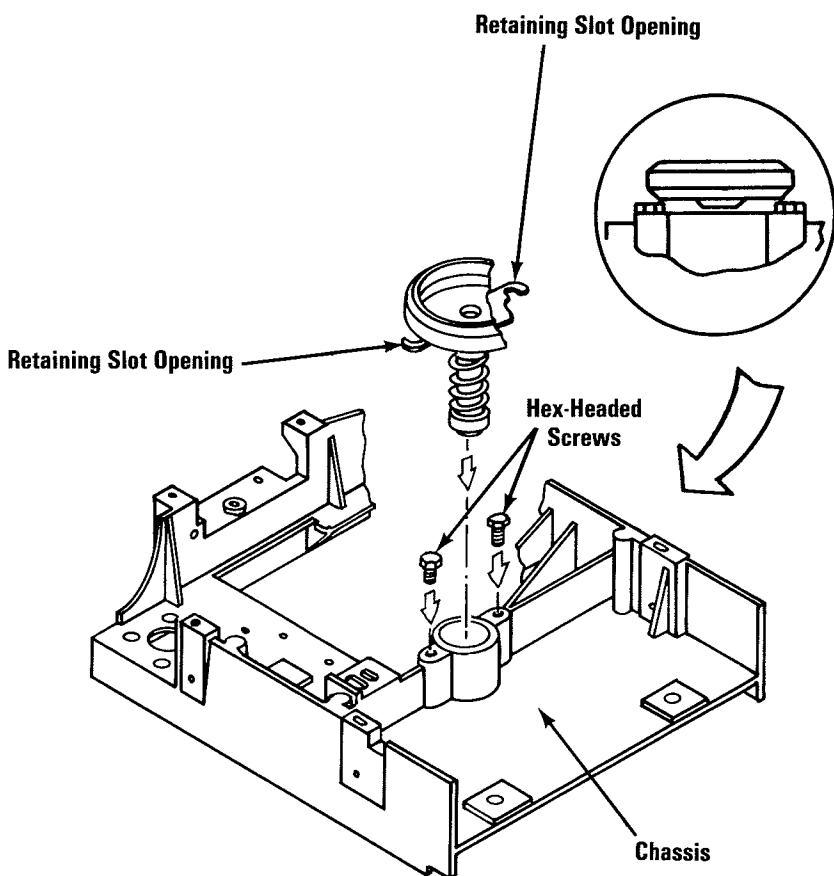
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5110) or (5115).
7. Remove the diskette drive printed circuit board (5120).
8. Remove the cone lever arm (5105).
9. Remove the drive belt (5125).
10. Remove the drive pulley screw and washers.



11. Remove the drive pulley by holding the spindle and twisting the pulley back and forth while pulling the pulley off.
12. Loosen the two hex-headed screws under the spindle.
13. Turn the spindle retainer counterclockwise until the retainer openings clear the hex-headed screws (see figure).
14. Remove the spindle assembly by pulling on the spindle and pushing on the spindle's shaft from the opposite side.

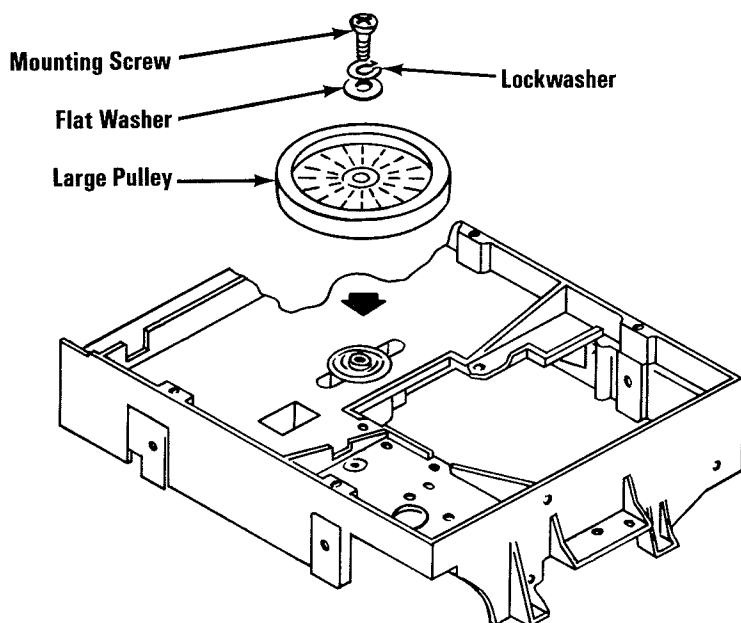


1. Insert the spindle assembly carefully into the mounting hole.
2. Turn the retainer clockwise until the retainer openings engage the hex-headed screws (see figure).
3. Tighten the two hex-headed screws.



Spindle Assembly Replacement (cont.) 5170

4. Place the pulley on the spindle's shaft.
5. Place the pulley's screw and the washers in position and tighten the screw while holding the spindle.
6. Replace the drive belt.
7. Replace the cone arm lever assembly (5105).

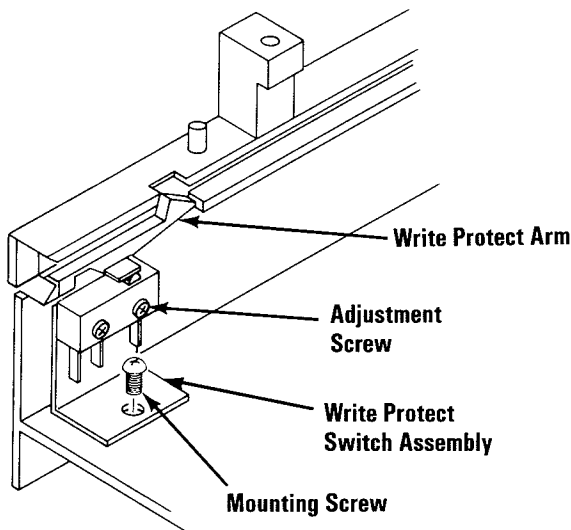


8. Replace the diskette drive printed circuit board (5120).
9. Replace the diskette drive assembly (5110) or (5115).
10. Replace the system unit's cover (5900).
11. Reconnect all cables.

Write Protect Switch Assembly Removal

5180

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5120).
7. Remove the mounting screw for the write protect switch (left side, at the front of the diskette drive).
8. Remove the wire ties, as necessary, along the left side of the frame and the right side of the motor.
9. Remove the write protect switch assembly.

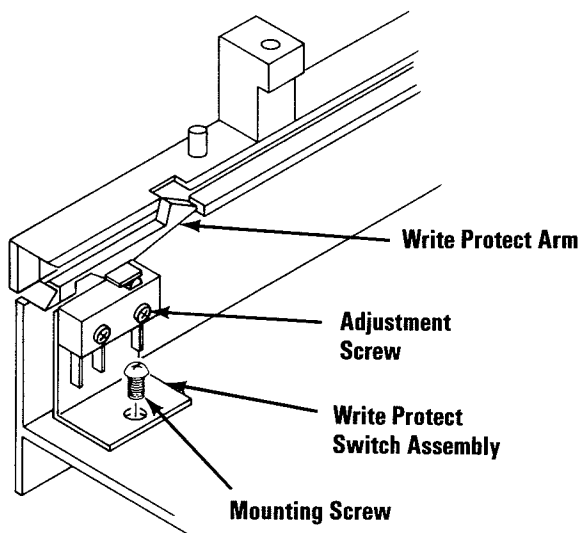


(Front View)

Write Protect Switch Assembly Replacement

5180

1. Place the write protect switch assembly in position on the left side, at the front of the diskette drive.
2. Replace the mounting screw for the switch assembly.



(Front View)

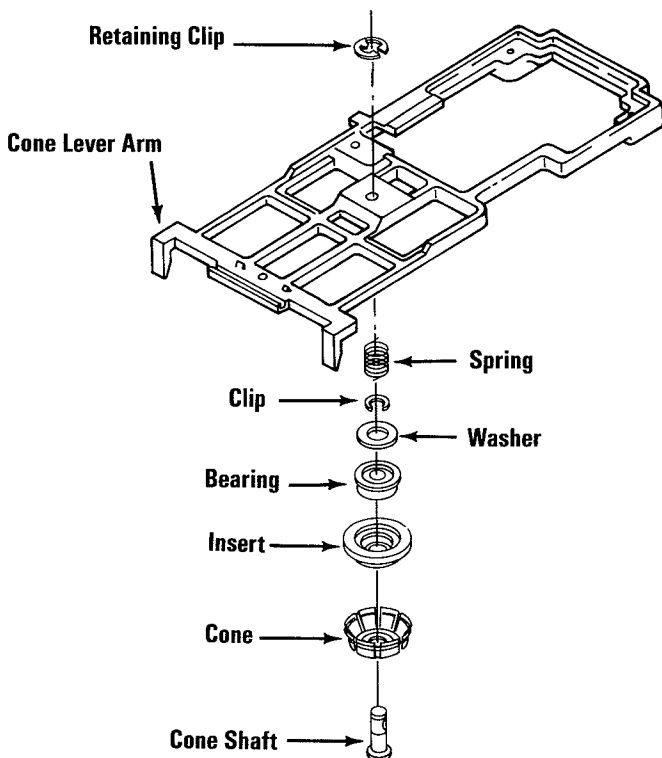
3. Place the cable along the left side of the frame and the right side of the motor.
4. Replace the wire ties.
5. Adjust the switch position so that when a diskette is inserted in the guides, the switch transfers without binding the diskette and the write protect assembly.
6. Install the diskette drive printed circuit board (5120).
7. Install the system unit's cover (5900).
8. Reconnect all cables.

Diskette Drive Type 2

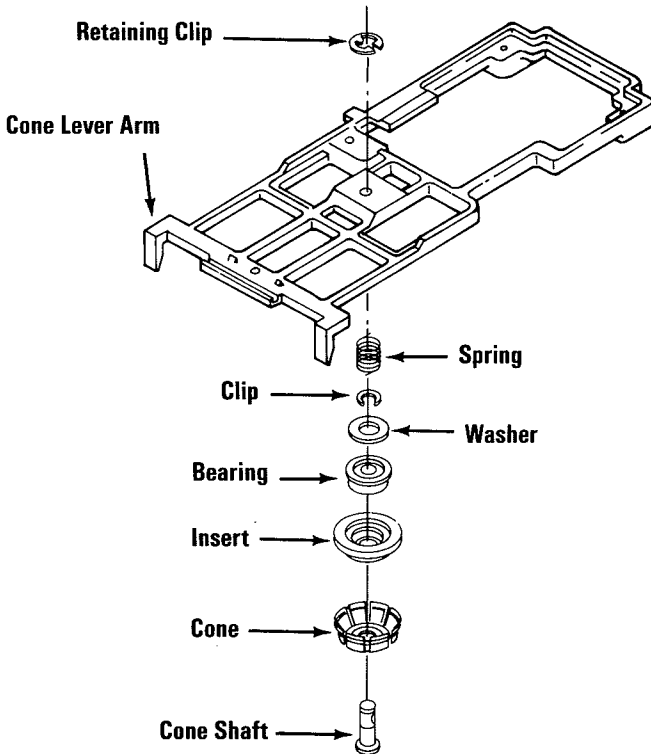
Cone Assembly Removal

5181

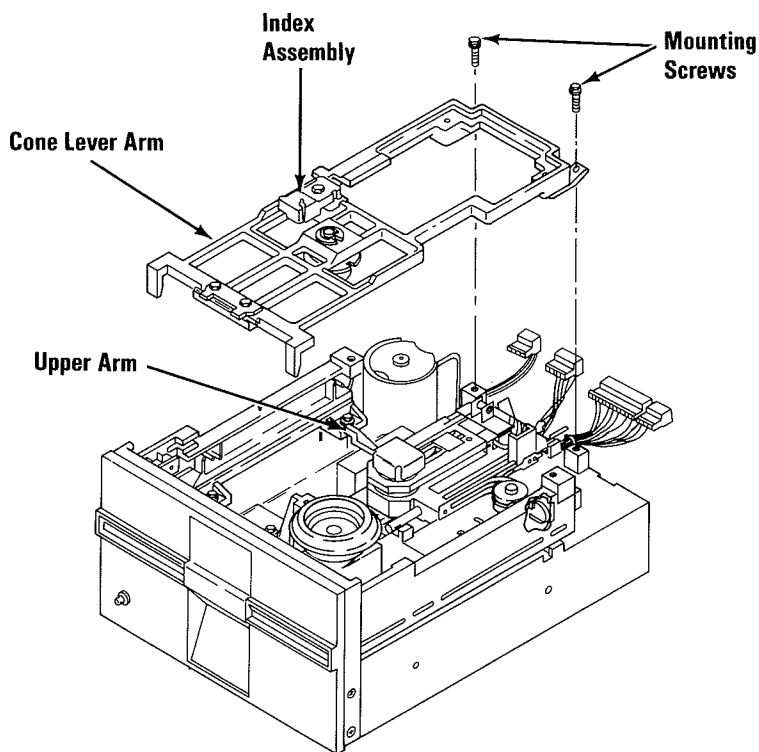
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the cone lever arm (5182).
8. Compress the cone assembly to relieve spring tension and remove the retaining clip from the top of the shaft.
9. Release the spring tension and allow the cone assembly to separate from the cone lever arm.



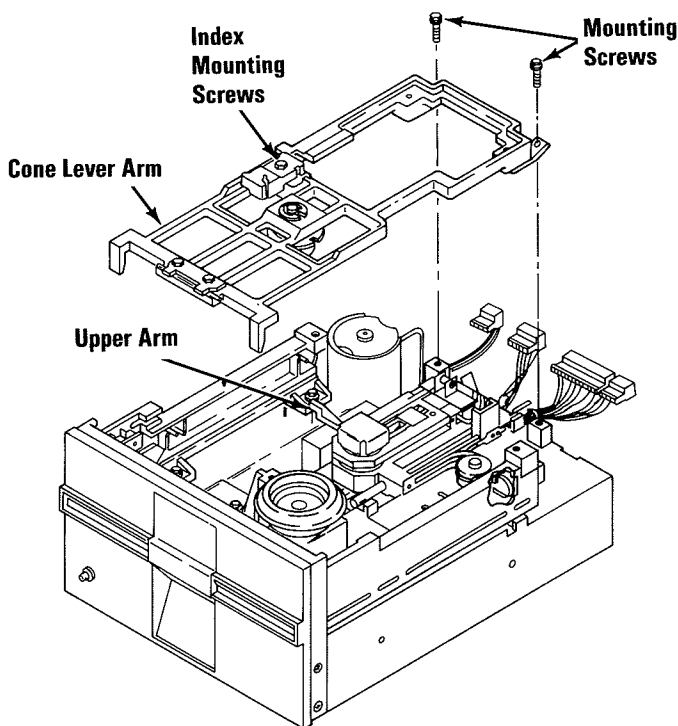
1. Arrange the cone assembly parts as shown in the figure, with the shaft through the cone lever arm and the spring compressed.
2. Replace the retaining clip on the shaft.
3. Replace the cone lever arm (5182).
4. Replace the diskette drive printed circuit board (5185).
5. Replace the system unit's cover (5900).
6. Reconnect all cables.



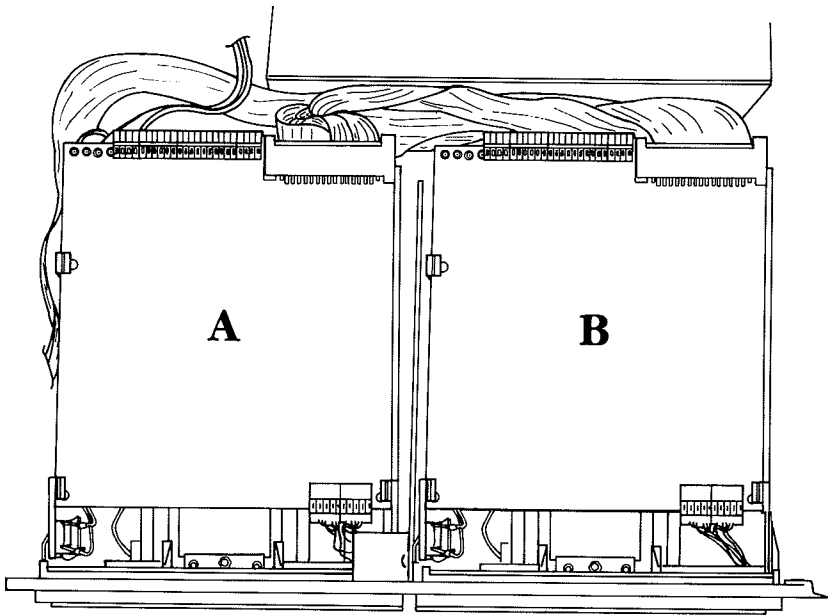
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the read/write head cable from the bracket, and the wire tie on the right diskette guide.
8. Remove the wire tie attaching the index cable to the cone lever assembly.
9. Remove the index assembly.
10. Remove the two mounting screws for the cone lever arm.
11. Slide the head carriage to the front of the diskette drive.
12. Release the upper arm by sliding the cone lever arm to the rear of the diskette drive.
13. Lift the cone lever arm out of the diskette drive.



1. Insert the latch assembly in its tracks; move the latch to the front of the diskette drive.
2. Carefully lower the cone lever arm and lift the upper arm over the cone lever arm.
3. Install the mounting screws (the shortest, silver colored screws, with the three dots on top); do not tighten.
4. Install the index assembly, mounting screw, and the washer (gold-colored with fine threads).
5. Tie the index assembly wire to the cone lever arm.
6. Route the head cables through the cone lever arm and along the right-hand diskette guide into the wire-holding bracket.
7. Tie the head cable wires to the diskette guide.
8. Close the latch assembly to engage the cone and hub.
9. Place the cone lever arm so that cone assembly is centered over the drive hub; tighten the screws.
10. Replace the diskette drive printed circuit board (5185).
11. Replace the system unit's cover (5900).
12. Reconnect all cables.



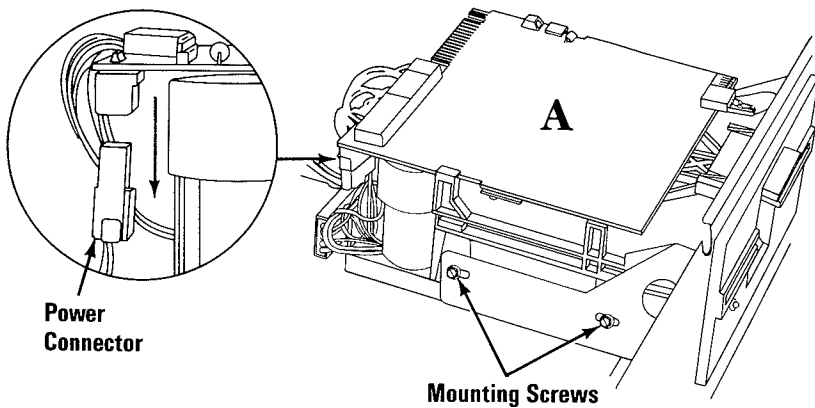
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Disconnect the signal cable from the diskette drive printed circuit board (5185).



7. Remove the two mounting screws on the left side of diskette drive A.

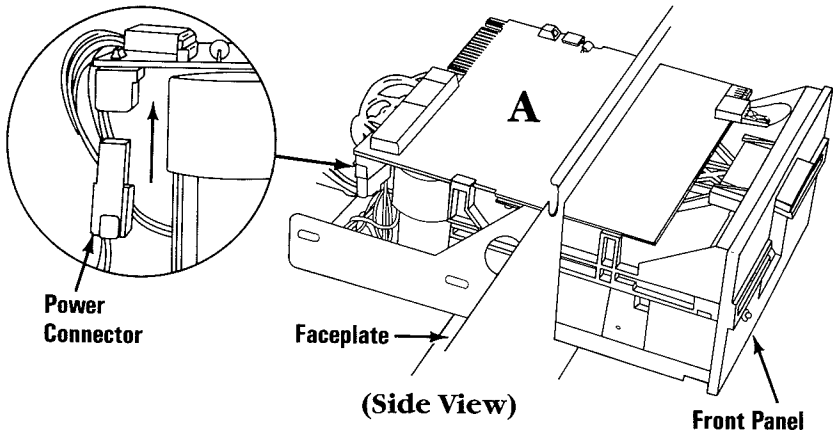
Note: Remove options adapters, as necessary, for access to the screws (5800).

8. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the left-rear corner of the diskette drive printed circuit board (5185).

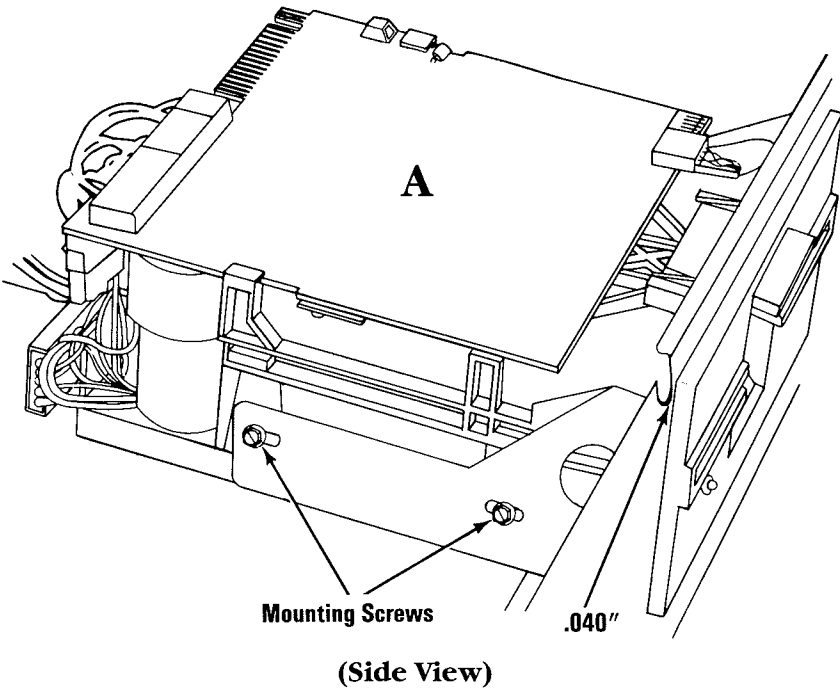


9. Remove the diskette drive from the system unit.

1. Slide diskette drive A in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board (5185).

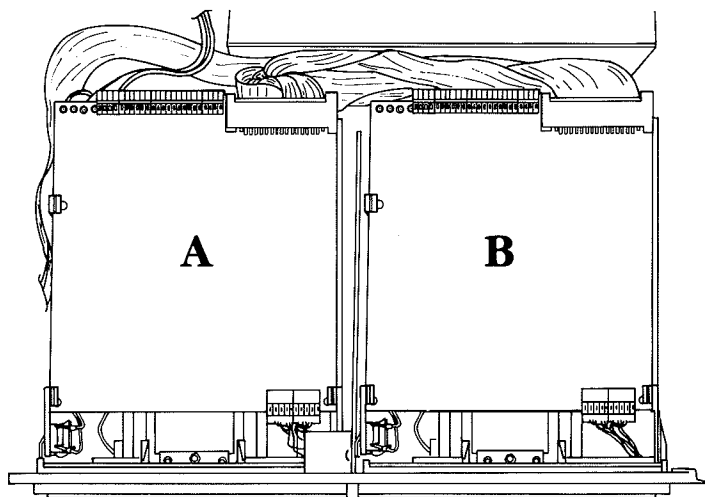


2. Slide diskette drive A in until the faceplate is even with the front panel.
3. Route the signal cable between the diskette drive and the power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Replace the 2 mounting screws. Move the diskette drive in or out for a clearance of .040" between the rear of the front panel and the faceplate; tighten the screws.

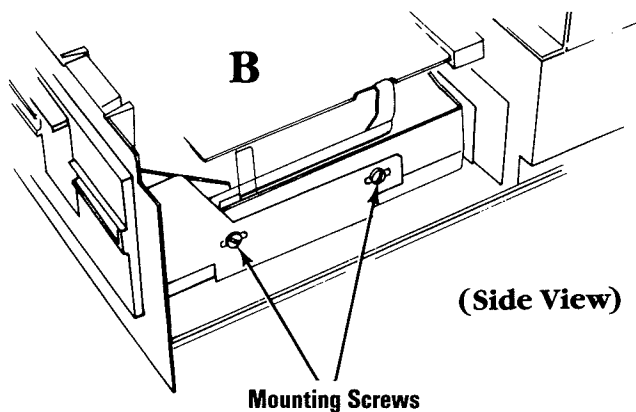


6. Replace any option adapters you removed (5800).
7. Replace the system unit's cover (5900).
8. Reconnect all cables.

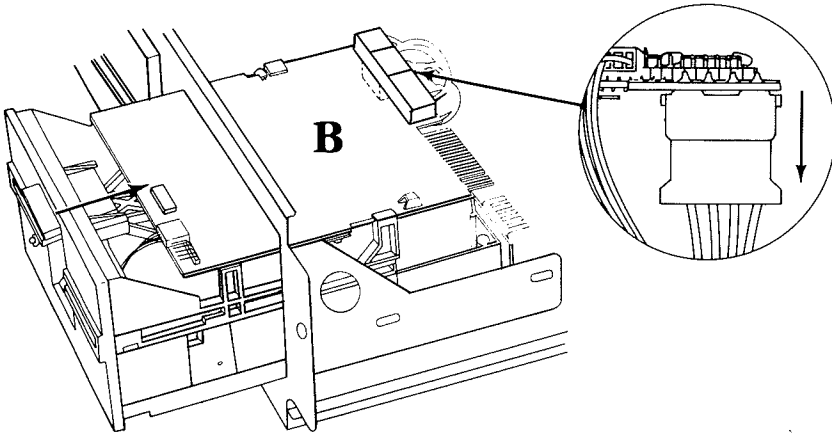
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Disconnect the signal cable from the diskette drive printed circuit board (5185).



7. Remove the two mounting screws on the right side of diskette drive B.



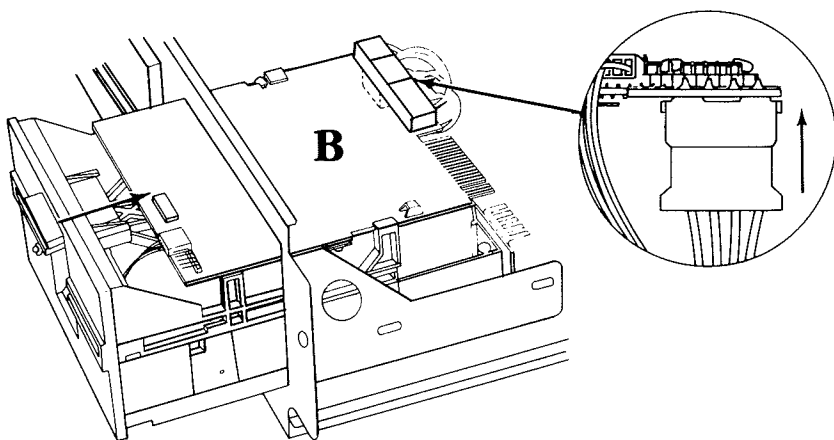
8. Slide the diskette drive approximately two inches out of the system unit. Remove the power connector from the left-rear corner of the diskette drive printed circuit board (5185).



(Side View)

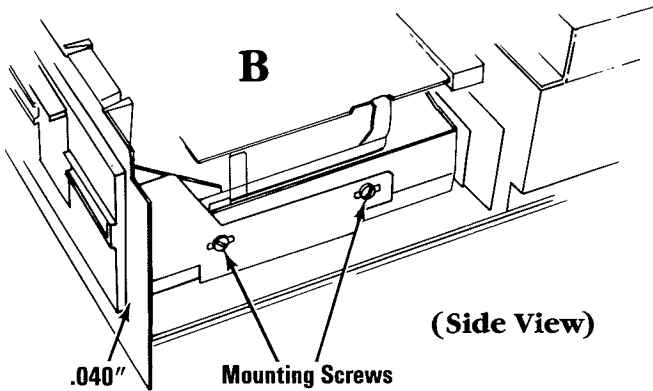
9. Remove the diskette drive from the system unit.

1. Slide the diskette drive B in until the front panel is approximately two inches from the frame. Connect the power cable to the diskette drive printed circuit board (5185).



(Side View)

2. Slide diskette drive B in until the faceplate is even with the front panel.
3. Route the signal cable between the diskette drive and the power supply.
4. Connect the end of the signal cable to the diskette drive.
5. Replace the two mounting screws. Move the diskette drive in or out for a clearance of .040" between the rear of the front panel and the faceplate; tighten the screws.

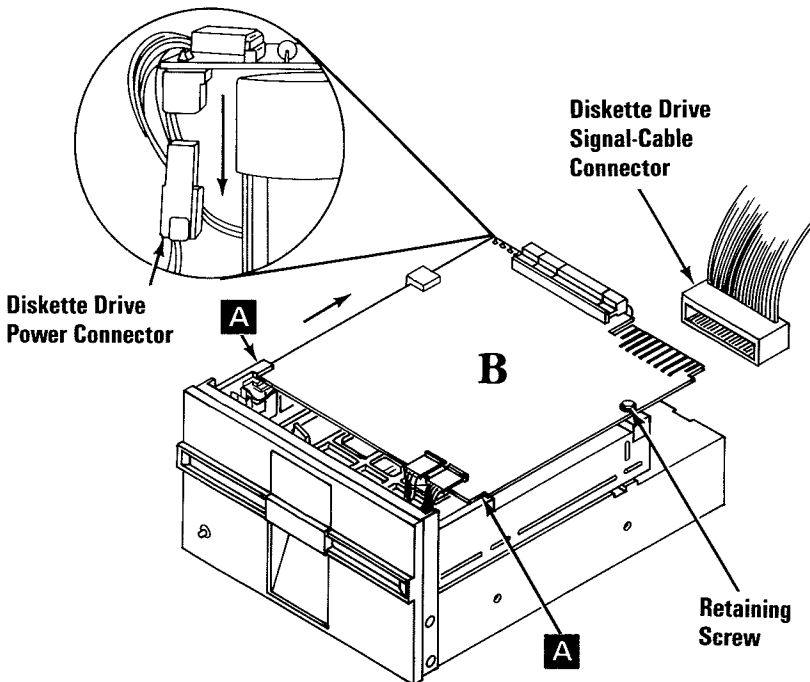


6. Remove the terminating resistor only on drive B (5185).
7. Replace the system's unit cover (5900).
8. Reconnect all cables.

Diskette Drive Logic Printed Circuit Board Removal

5185

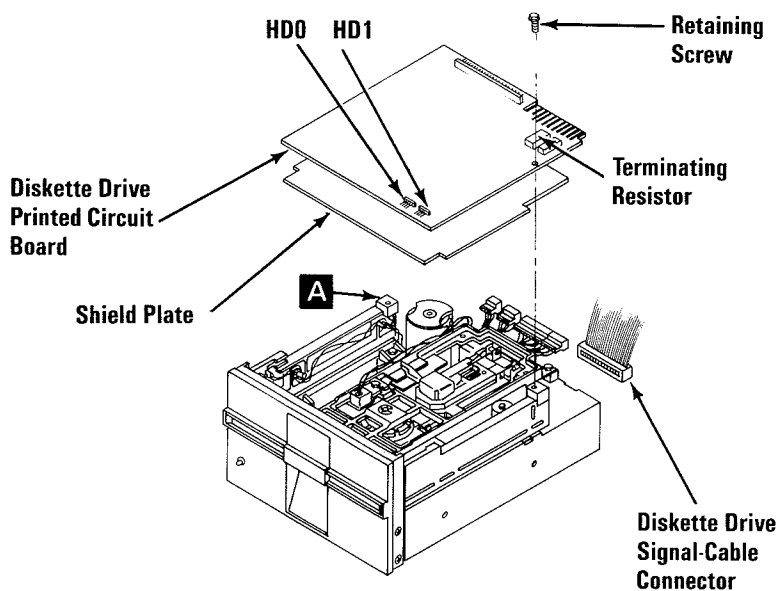
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Disconnect all connectors from the rear, and the head cables from the right front of the diskette drive printed circuit board.
7. Remove the retaining screw.
8. Slide the diskette drive printed circuit board toward the rear until it clears the front guide brackets **A**.
9. Lift the right side of the diskette drive printed circuit board up and out to clear the brackets.
10. Disconnect the diskette drive's power connector from the left rear corner of the diskette drive printed circuit board.
11. Remove the shield plate.



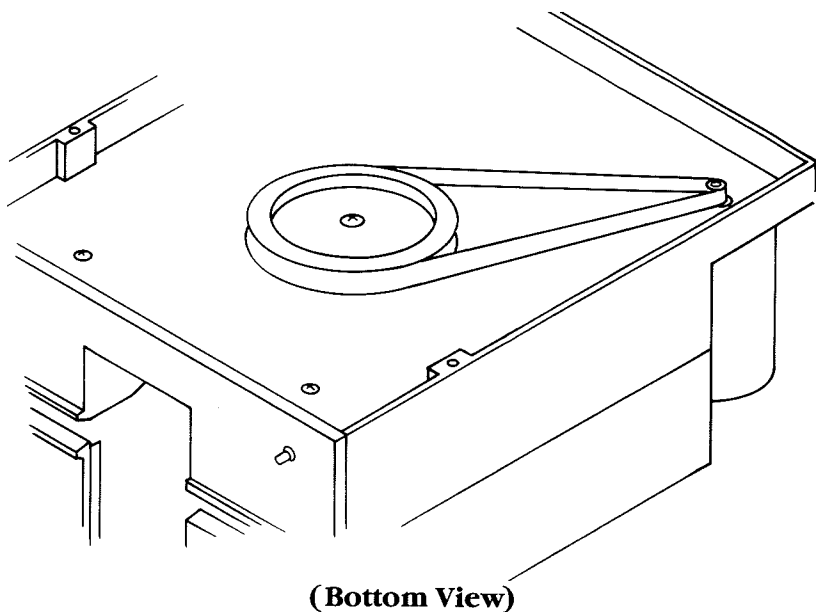
Diskette-Drive Logic Printed-Circuit Board Replacement

5185

1. Replace the shield plate with the metal side down.
2. Connect the diskette drive's power connector under the left rear corner of the diskette drive printed circuit board.
3. Guide the left side of the printed circuit board into the left rear guide bracket **A**.
4. Slide the printed circuit board into the front guide brackets, align the hole in the printed circuit board with the threaded hole in the right diskette guide.
5. Insert the retaining screw.
6. Connect the connectors at the left rear of the diskette drive printed circuit board. The first connector on the left is a 4-pin connector for the drive motor, the second connector is a 6-pin connector, the third connector is a 10-pin connector, and the fourth connector is a 4-pin connector.
7. Connect the diskette drive's signal cable at the right rear of the diskette drive printed circuit board.
8. Connect the head connectors, HD1 outside and HD0 inside, to the right front of the diskette drive printed circuit board.
9. Remove the terminating resistor only on drive B.
10. Replace the system unit's cover (**5900**).
11. Reconnect all cables.



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5183) or (5184).
7. Carefully place the diskette drive on a work surface with the drive belt and pulleys facing up.
8. Lift the drive belt off the large pulley, then off the small pulley.

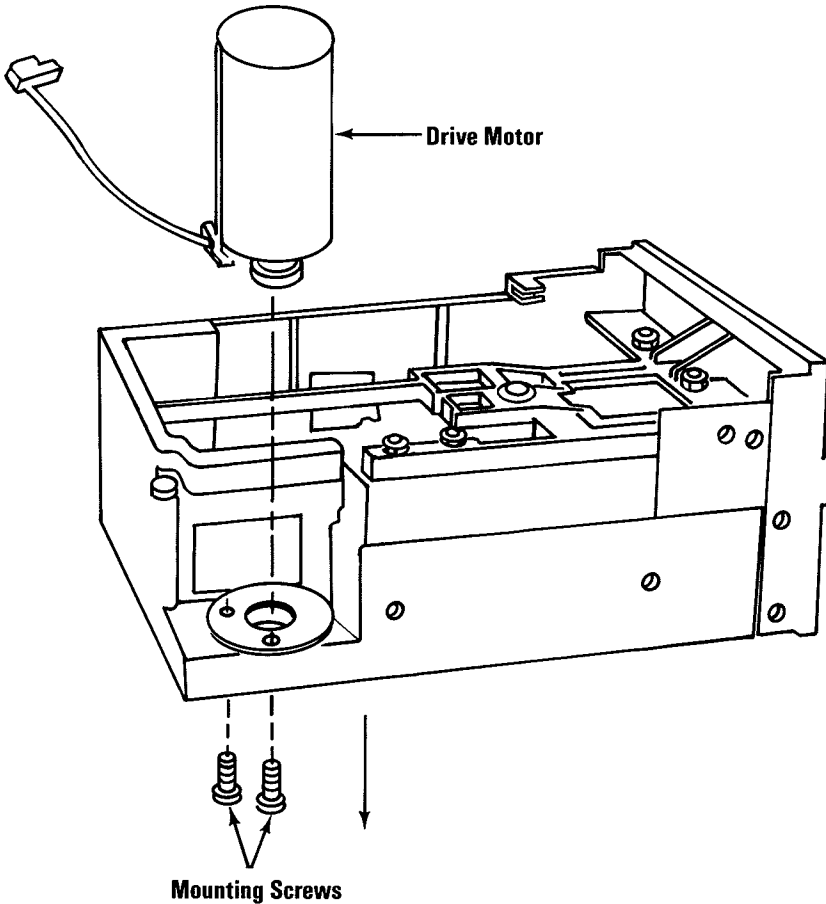


Drive Belt Replacement

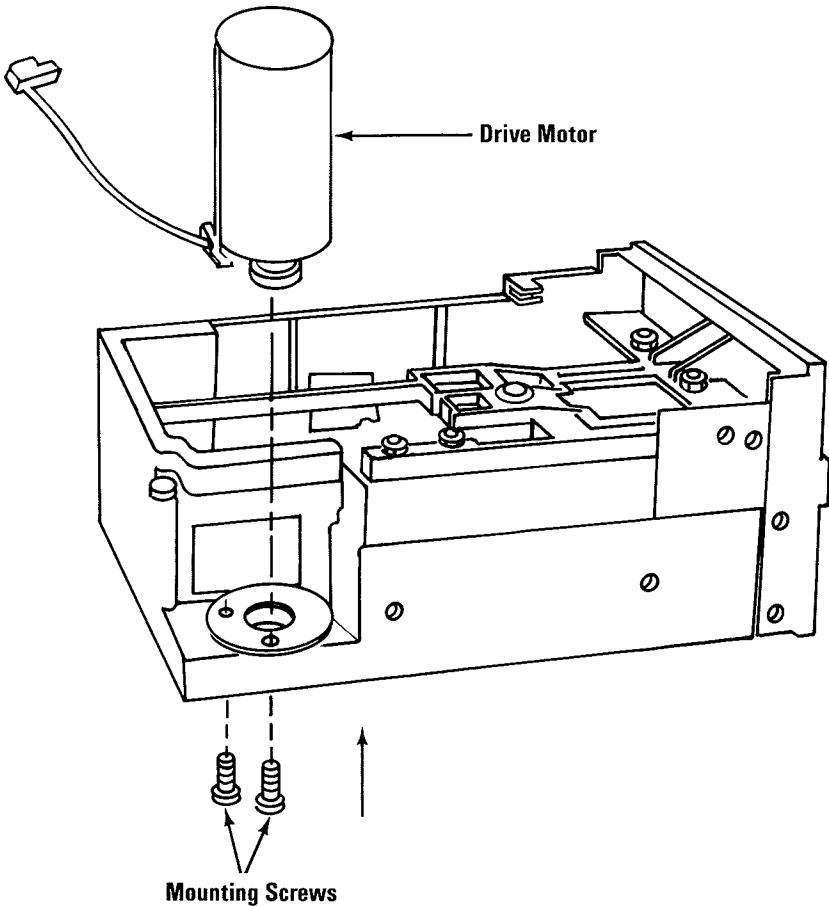
5186

1. Place the drive belt around the small pulley (dark, shiny side facing pulleys), then around the large pulley.
2. Replace the diskette drive (5183) or (5184).
3. Replace the system unit's cover (5900).
4. Reconnect all cables.

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover (5900).
5. Remove the diskette drive (5183) or (5184).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the drive belt (5186).
8. Remove the drive motor's mounting screws.
9. Carefully lift the drive motor out of the diskette drive.



1. Insert the motor in the frame; align the threaded holes in the motor with the holes in the frame (motor wires should face the left rear corner of the drive).
2. Replace the mounting screws.
3. Replace the drive belt (5186).
4. Replace the diskette drive printed circuit board (5185).
5. Replace the diskette drive (5183) or (5184).
6. Replace the system unit's cover (5900).
7. Reconnect all cables.



1. Insert the Advanced Diagnostics diskette.
2. Set the Power switch on the expansion unit (if attached) and system unit to On.
3. Advance to diagnostic menu 8 (refer to "Diagnostic Menu Reference," Section 2).
4. In menu 8, select option 4, SPEED TEST, for the diskette drive you are testing. The diskette drive's speed and the adjustment specification appear on the screen.

Note: If you are unable to load the Advanced Diagnostics diskette, or if the speed test will not execute, refer to "Drive-Motor Preliminary Speed Adjustment" (5189).

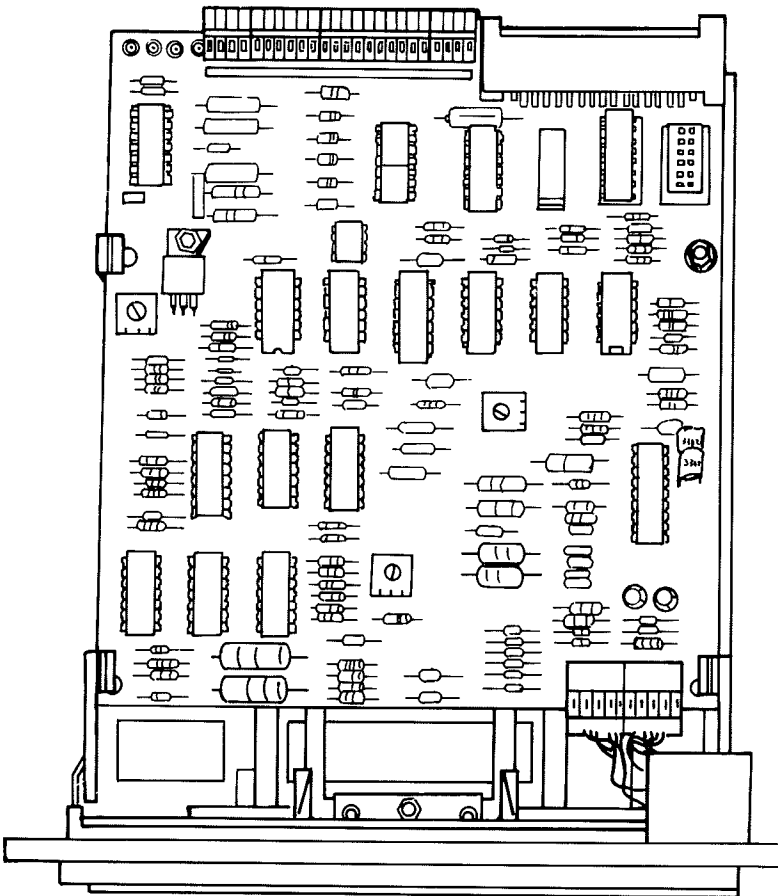
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

SPEED IS 1999

ADJUST FOR 1980 TO 2020

5. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
6. Set all external Power switches off (printer, TV, etc.).
7. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
8. Disconnect all cables from the rear of the system unit.
9. Remove the system unit's cover (**5900**).
10. Reconnect all cables.
11. Insert the Advanced Diagnostics diskette.
12. Set the Power switch on the expansion unit (if attached) and the system unit to On.



13. Advance to diagnostic menu 8 (refer to "Diagnostic Menu Reference," Section 2).
14. Select option 4, SPEED TEST, for the drive you are adjusting. The diskette drive's speed and the adjustment specification appear on the screen.

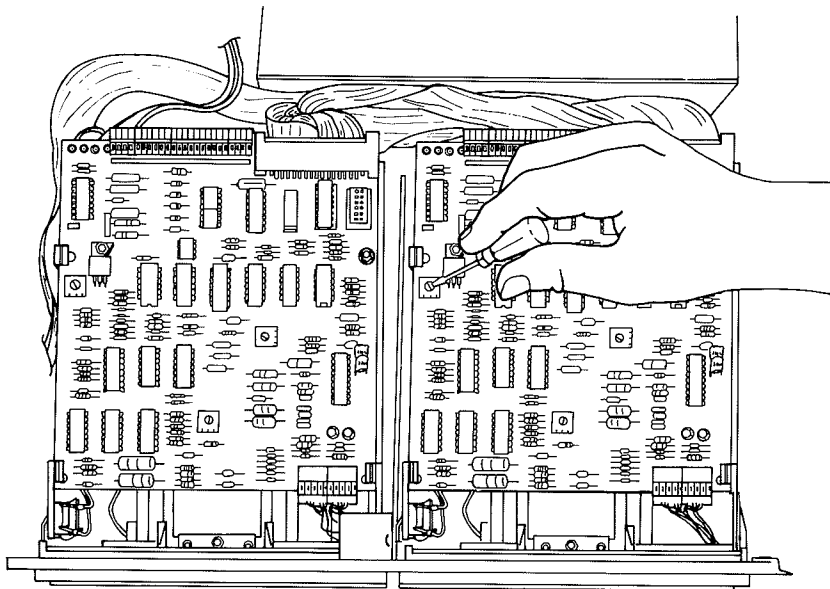
SPEED IS 2000

ADJUST FOR 1980 TO 2020
PRESS ANY KEY TO EXIT

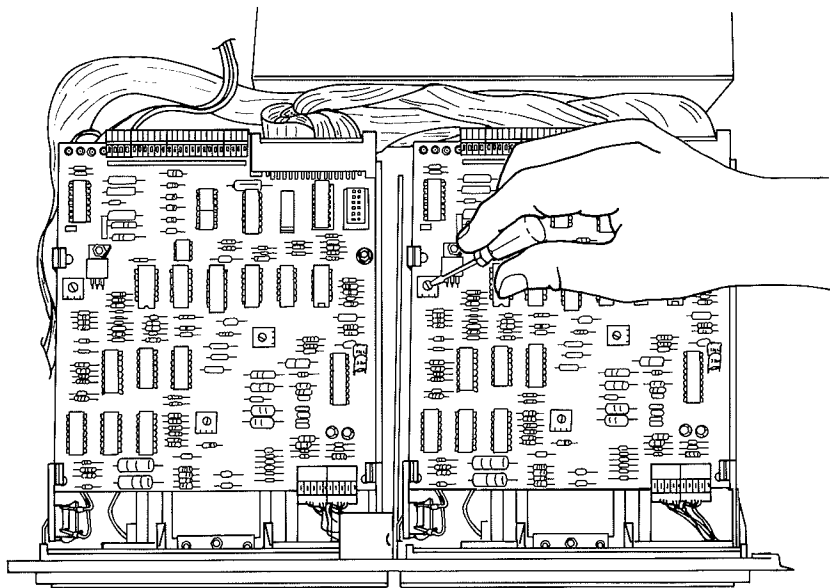
SPEED IS 1999

ADJUST FOR 1980 TO 2020

15. The adjustment for the diskette drive's speed is a variable resistor on the diskette drive printed circuit board. To adjust the speed, carefully insert an insulated screwdriver into the screw on the top of the variable resistor.



16. Turn the screw until the speed shown on the screen is within the required specifications.

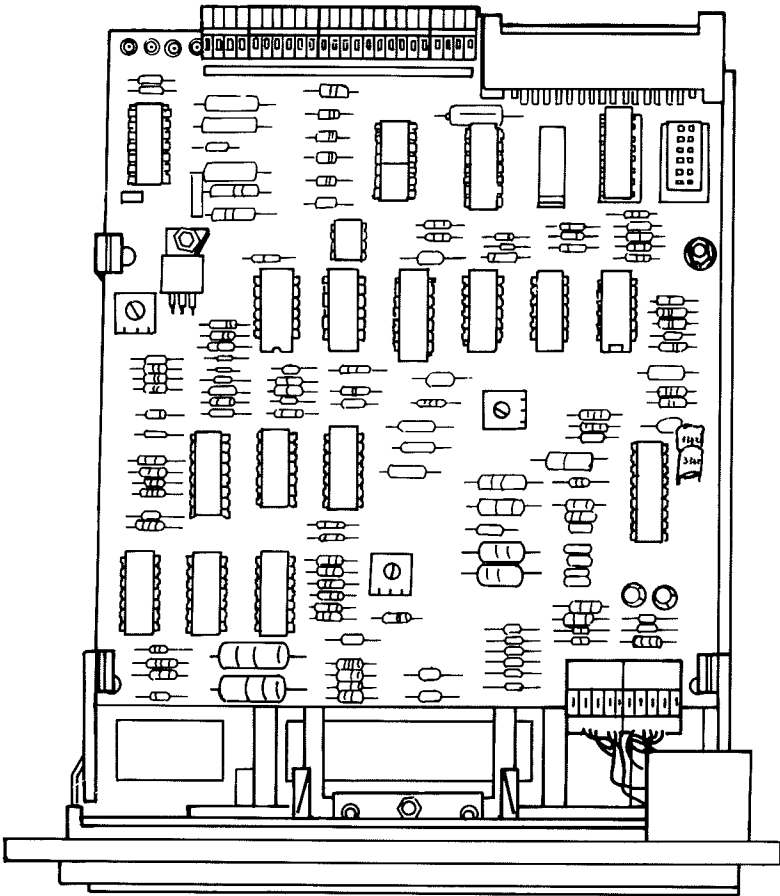


17. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
18. Set all external Power switches off (printer, TV, etc.).
19. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
20. Disconnect all cables from the rear of the system unit.
21. Replace the system unit's cover (5900).
22. Reconnect all cables.

Drive Motor Preliminary Speed Adjustment

5189

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear on the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5183) or (5184).

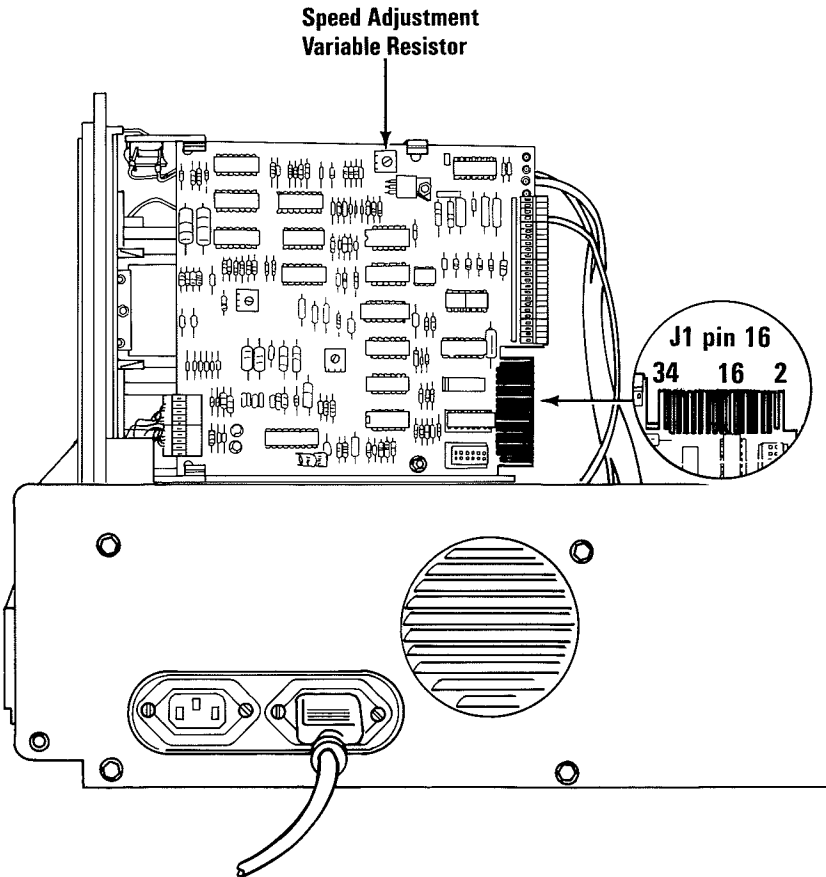


7. Insert a scratch diskette into the diskette drive.

Drive Motor Preliminary Speed Adjustment (cont.)

5189

8. Place the diskette drive (left side up) on the system unit's power supply.
9. Connect a jumper between J-1 pin 16 on the diskette drive logic printed circuit board and ground.
10. Plug power connector P-3 into the diskette drive printed circuit board.
11. Plug the system unit's power cord into the system unit, then into the wall outlet.
12. Set the system unit's Power switch to On.



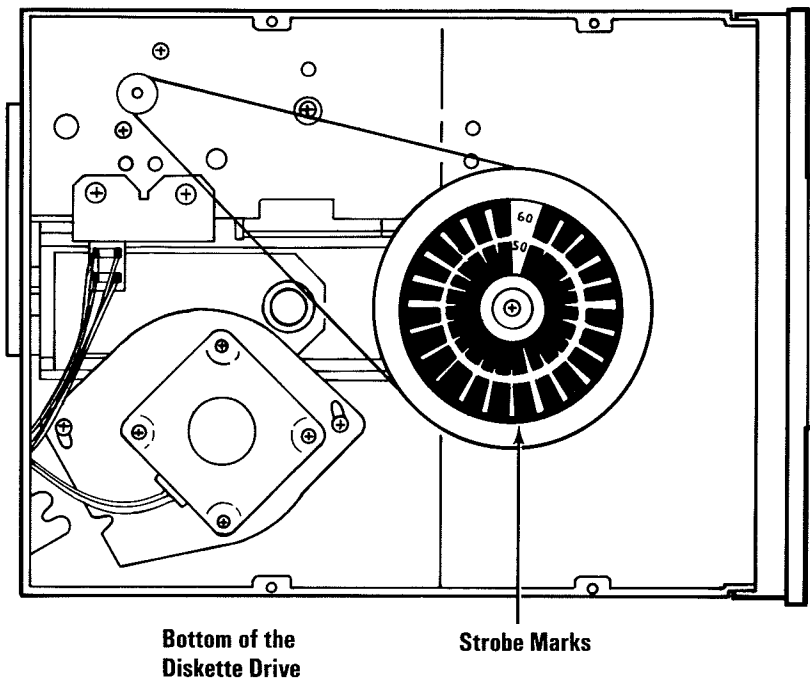
(Rear View)

Drive Motor Preliminary Speed Adjustment (cont.)

5189

13. Observe in fluorescent light the black strobe marks on the outer ring of the drive pulley and adjust the variable resistor on the diskette drive printed circuit board until the strobe marks appear to stand still.

Note: The outer ring of strobe marks is for 60 hertz, and the inner ring is for 50 hertz.

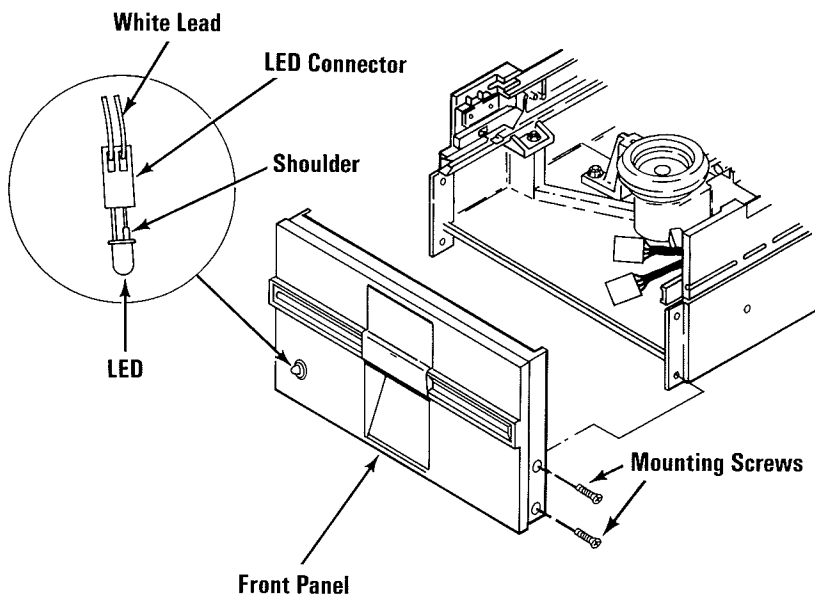


Drive-Motor Preliminary Speed Adjustment (cont.)

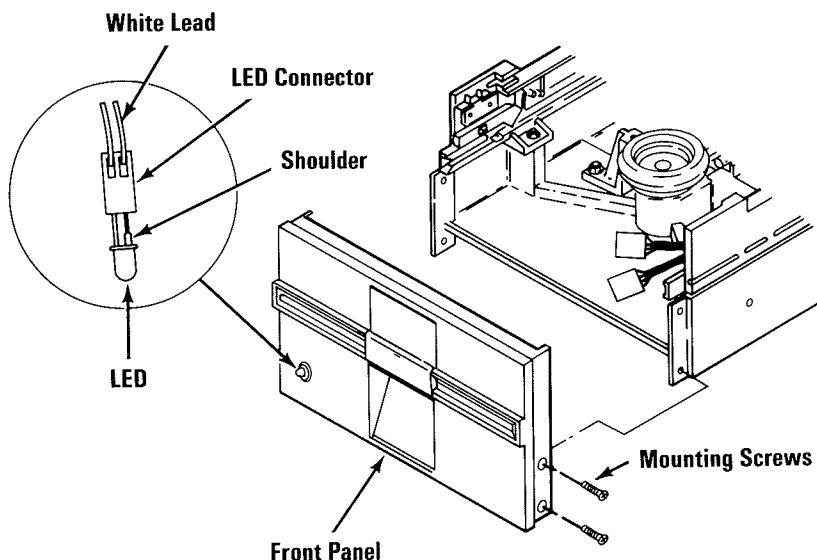
5189

14. Set the system unit's Power switch to Off.
15. Disconnect the system unit's power cord from the wall outlet.
16. Disconnect the system unit's power cord from the rear of the system unit.
17. Replace the diskette drive **(5183)** or **(5184)**.
18. Use "Drive-Motor Speed Adjustment" to verify that the speed is within specification. Adjust if necessary.
19. Replace the system unit's cover **(5900)**.
20. Reconnect all cables.

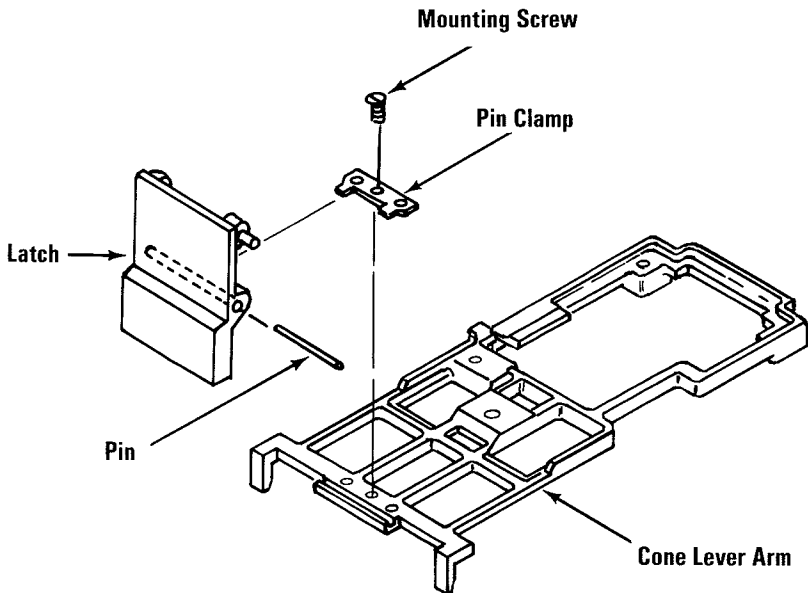
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cords from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5183) or (5184).
7. Open the latch on the front of the diskette drive.
8. Remove the diskette drive printed circuit board (5185).
9. Remove the connector from the LED assembly.
10. Place the diskette drive on its right side and remove the two left front panel mounting screws.
11. Place the diskette drive on its left side and remove the two right front panel mounting screws.
12. Remove the front panel from the diskette drive.



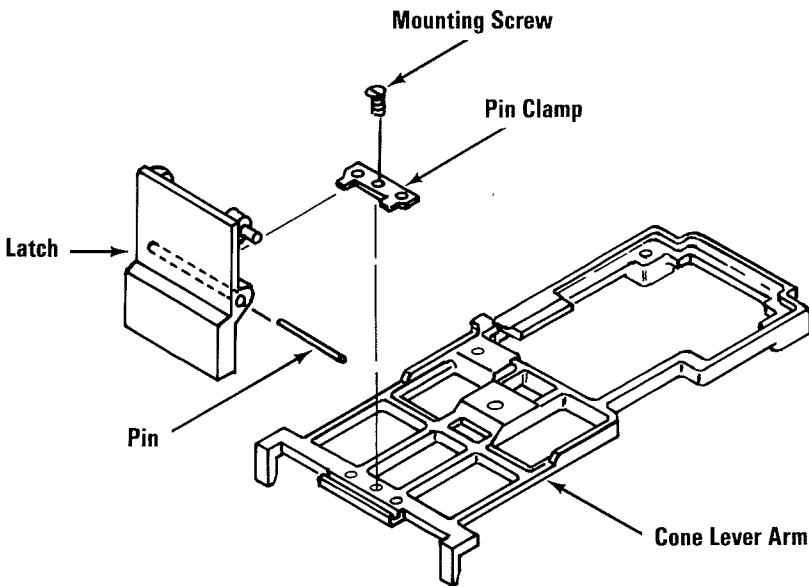
1. Install the front panel by inserting the latch in its slots and positioning the panel in place.
2. Place the diskette drive on its right side and install two mounting screws.
3. Place the diskette drive on its left side and install two mounting screws.
4. Install the LED connector, making sure the white wire goes on the shouldered lead of the LED (see figure).
5. Replace the diskette drive printed circuit board (5185).
6. Replace the diskette drive (5183) or (5184).
7. Replace the system unit's cover (5900).
8. Reconnect all cables.



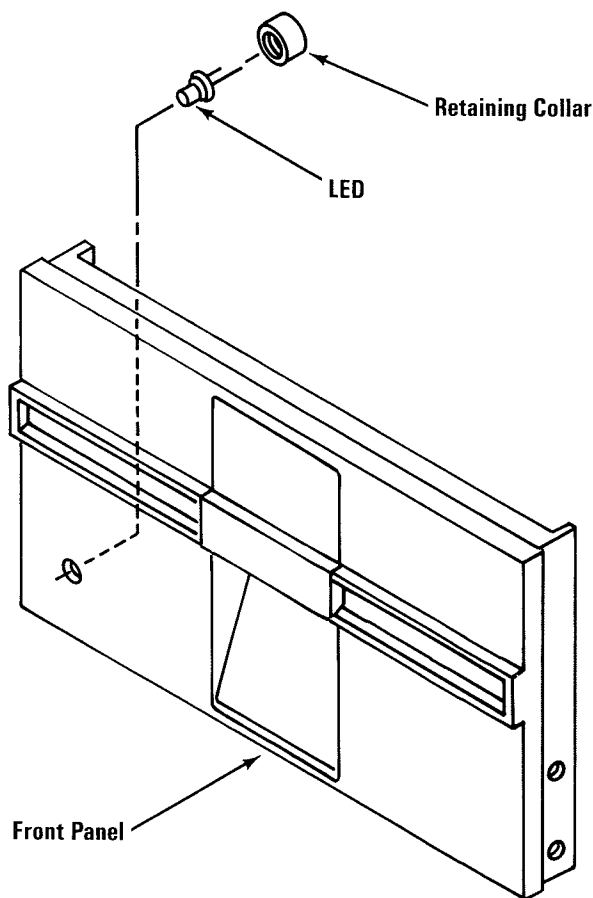
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover (5900).
5. Remove the diskette drive printed circuit board (5185).
6. Close the latch and remove the mounting screw holding the pin clamp.
7. Remove the pin clamp.
8. Open the latch, push the cone arm down, and remove the latch by pulling toward the rear.



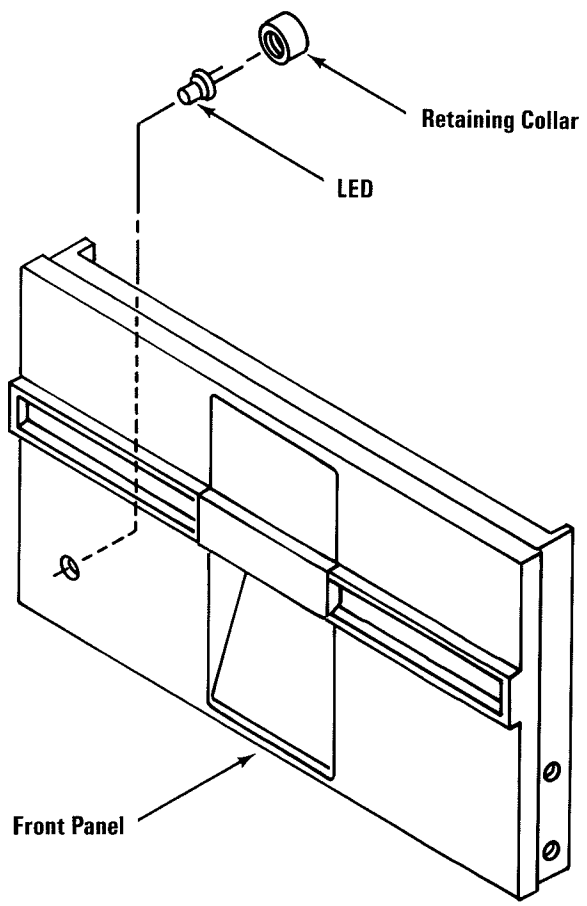
1. Push the cone arm down and slide the latch into its slots from the rear, then close the latch.
2. Replace the pin clamp.
3. Replace the mounting screw.
4. Replace the diskette drive printed circuit board (5185).
5. Replace the system unit's cover (5900).
6. Reconnect all cables.



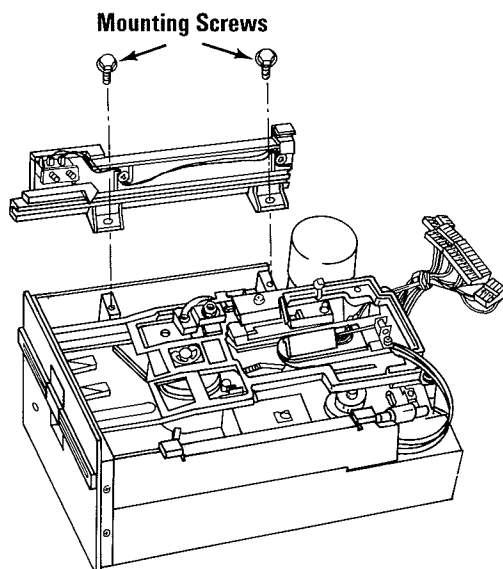
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover (5900).
5. Remove the diskette drive (5183) or (5184).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the front panel of the diskette drive (5190).
8. Remove the retaining collar that holds the LED to the front panel.
9. Remove the LED from the front panel by pushing on the LED from the front of the front panel.



1. Insert the LED into the front panel.
2. Insert the retaining collar over the back of the LED in the front panel.
3. Replace the front panel (5190).
4. Replace the diskette drive printed circuit board (5185).
5. Replace the diskette drive (5183) or (5184).
6. Replace the system unit's cover (5900).
7. Reconnect all cables.



1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the wires to the write protect switch.
8. Remove the screws that hold the guide to the frame.
9. Slide the guide to the rear and lift it from the frame.

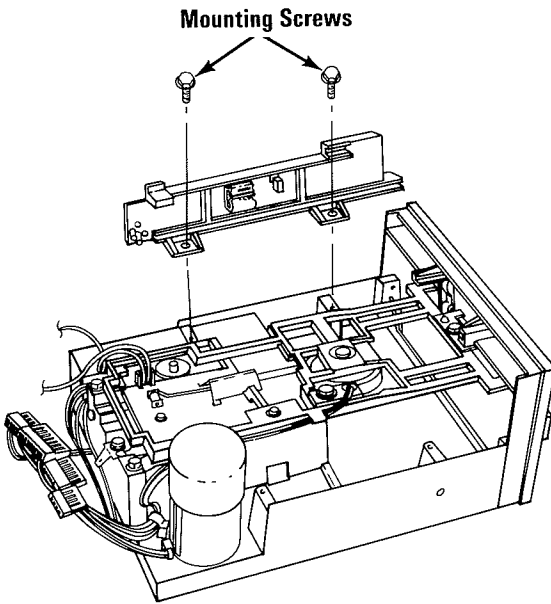


Left Diskette Guide Replacement

5193

1. Slide the guide to the front of the diskette drive, align the holes, and install the mounting screws.
2. Reroute the wires in the guide and connect the wires to the write-protect switch (5196).
3. Replace the diskette-drive printed circuit board (5185).
4. Replace the system unit's cover (5900).
5. Reconnect all cables.

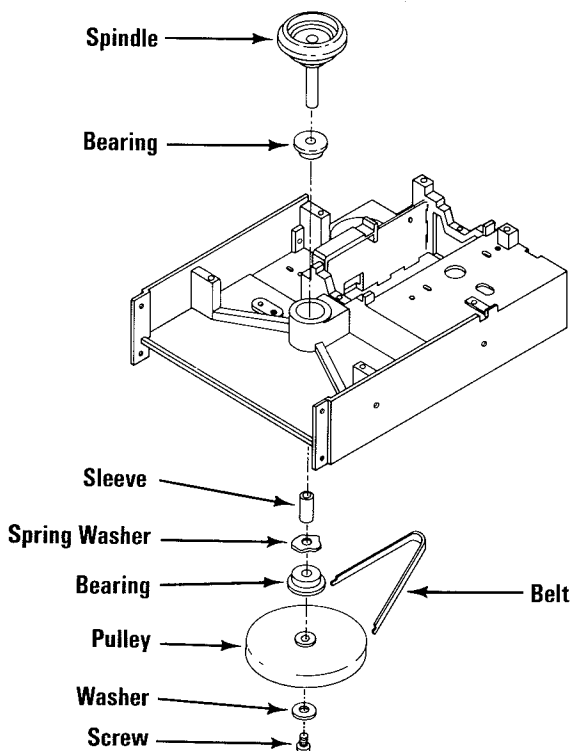
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the head cables from the diskette guide.
8. Remove the screws that hold the guide to the frame.
9. Move the guide to the rear and lift it from the diskette drive.



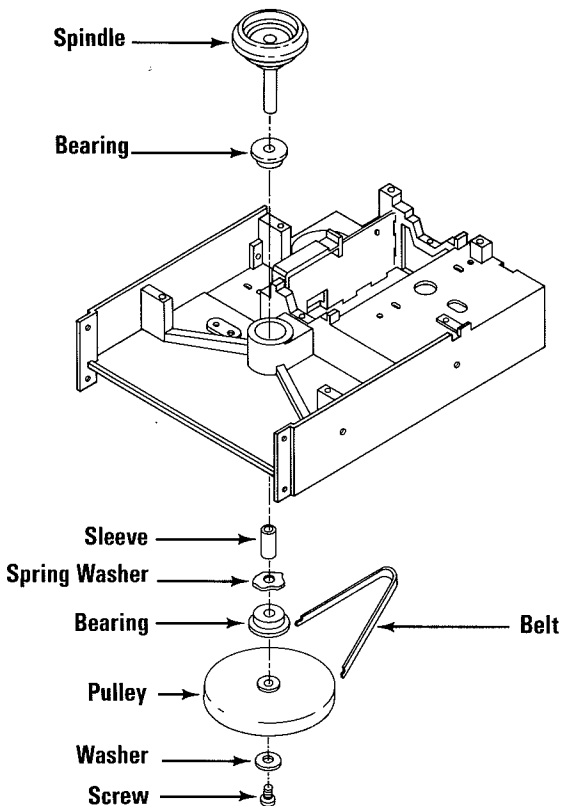
Right Diskette Guide Replacement 5194

1. Move the guide to the front of the diskette drive, align the holes, and install the mounting screws.
2. Replace the diskette drive head wires in the guide.
3. Replace the diskette drive printed circuit board (5185).
4. Replace the system unit's cover (5900).
5. Reconnect all cables.

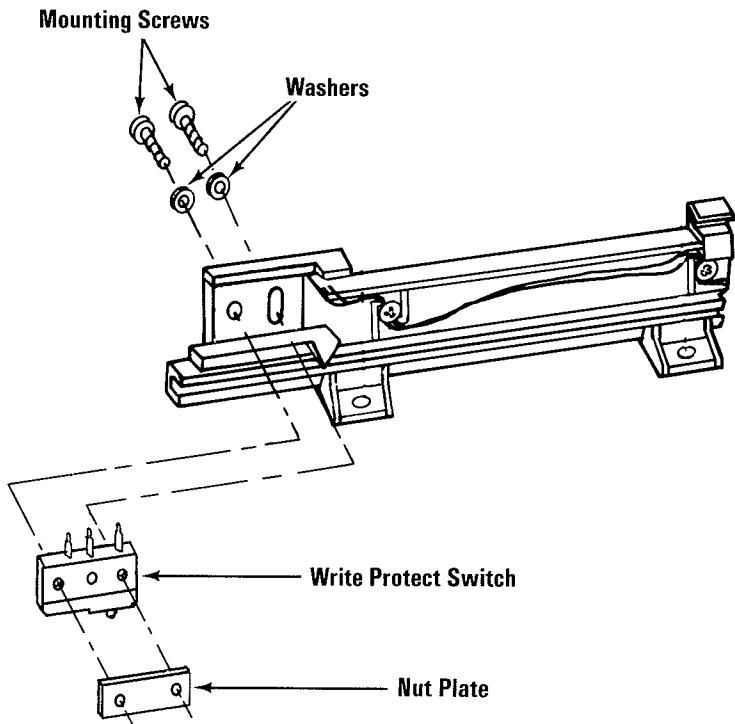
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit's cover (5900).
6. Remove the diskette drive (5183) or (5184).
7. Remove the diskette drive printed circuit board (5185).
8. Remove the cone lever arm (5182).
9. Remove the drive belt (5186).
10. Remove the drive pulley screw and washer(s).
11. Remove the drive pulley by holding the spindle and twisting the drive pulley back and forth while pulling on the pulley.
12. Remove the spindle assembly by pulling on the spindle and pushing on the spindle's shaft from the opposite side.



1. Carefully insert the spindle assembly into the mounting hole.
2. Replace the sleeve, bearing, and spring washer.
3. Replace the diskette drive's pulley; hold the spindle and install the washers and the screw; turn the screw clockwise to tighten.
4. Replace the diskette drive belt (5186).
5. Replace the cone lever arm (5182).
6. Replace the diskette drive logic printed circuit board (5185).
7. Replace the diskette drive assembly (5183) or (5184).
8. Replace the system unit's cover (5900).
9. Reconnect all cables.

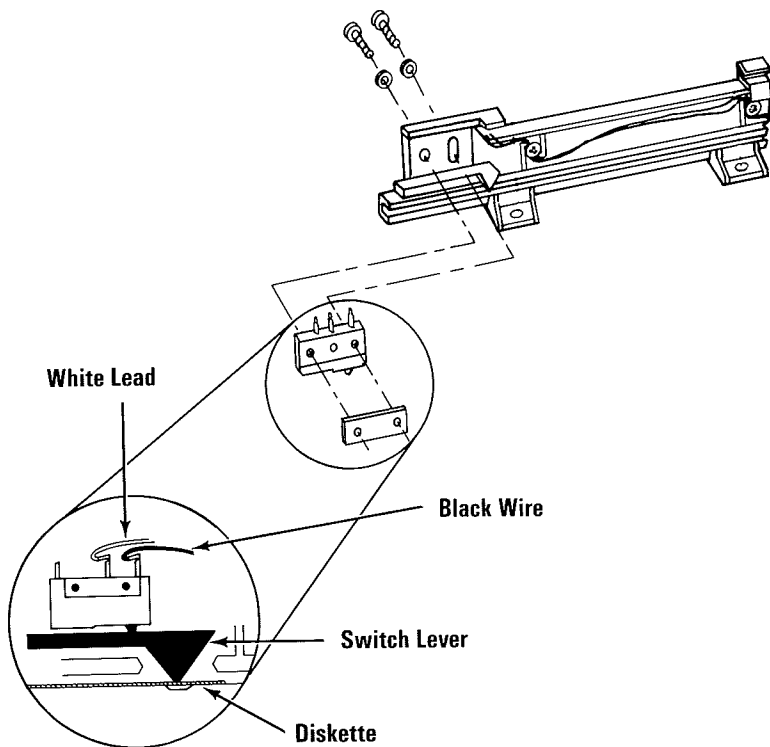


1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit's cover (5900).
5. Remove the diskette drive (5183) or (5184).
6. Remove the diskette drive printed circuit board (5185).
7. Remove the connectors from the write protect switch.
8. Remove the mounting screws, washers, nut plate, and write protect switch.



Write Protect Switch Replacement 5196

1. Insert the write protect switch and nut plate in position.
2. Put the mounting screws and washers in position (do not tighten at this time).
3. Insert a diskette half way into the drive move the switch up then move it down until you hear it operate.
4. Tighten the mounting screws and check to see that the write protect switch operates when you first insert the diskette and again when the switch lever drops into the write protect notch on the diskette. Readjust if necessary.
5. Connect the connectors on the write protect switch (white wire on the center connector and the black wire on the rear connector).
6. Replace the diskette drive printed circuit board (5185).
7. Replace the diskette drive (5183) or (5184).
8. Replace the system unit's cover (5900).
9. Reconnect all cables.



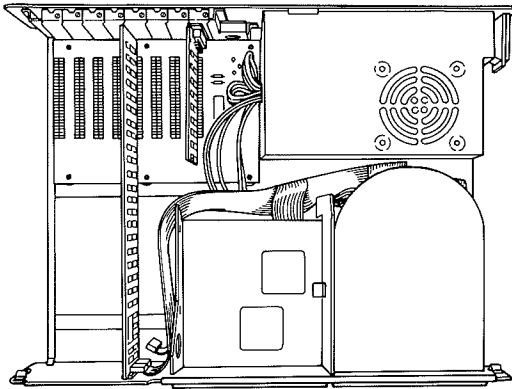
Fixed Disk Drive

Drive C Removal

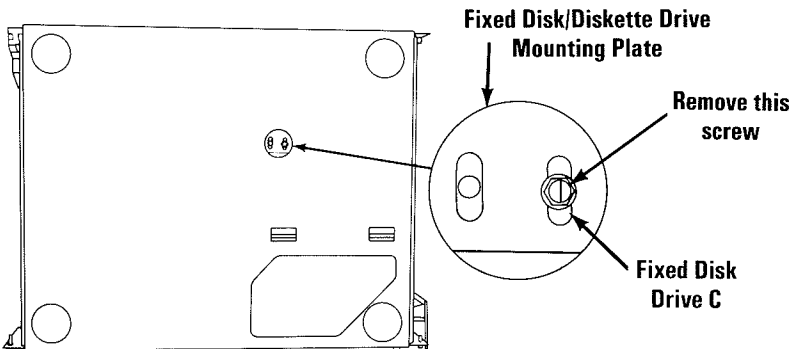
5200

WARNING: Normal shipping and handling can result in permanent loss of all data and formatting of the fixed disk drive(s). It is recommended that all files be backed up onto diskettes.

1. Set the expansion unit Power switch to Off, then unplug the expansion unit power cord and remove all cables from the rear of the unit.
2. Place the keyboard, display, and all external options away from the work surface.
3. Remove the expansion unit cover (5900).

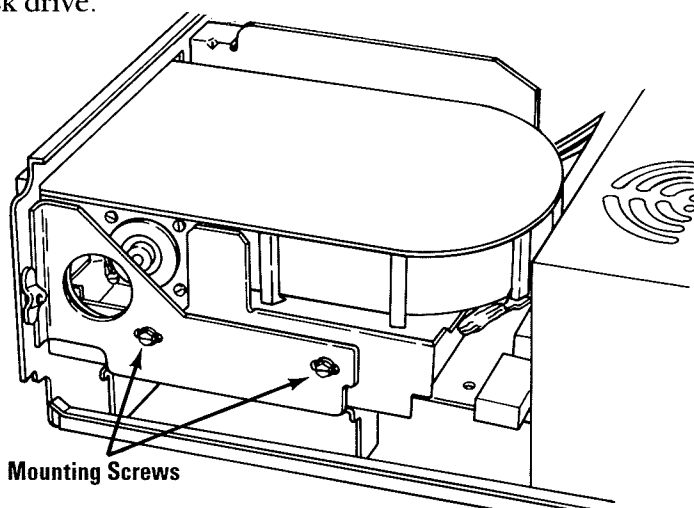


4. Tilt the unit up and remove the fixed disk drive mounting plate screw as shown below.

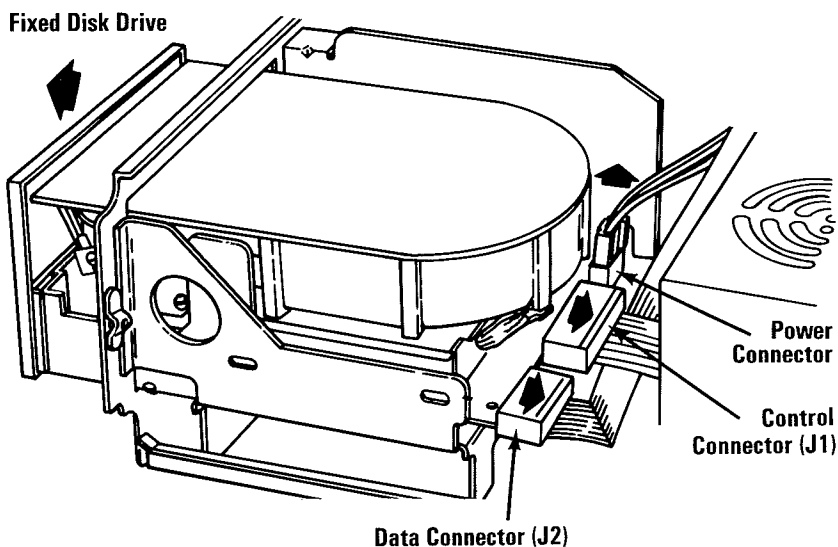


(Bottom View)

5. Remove the two mounting screws on the right side of the disk drive.



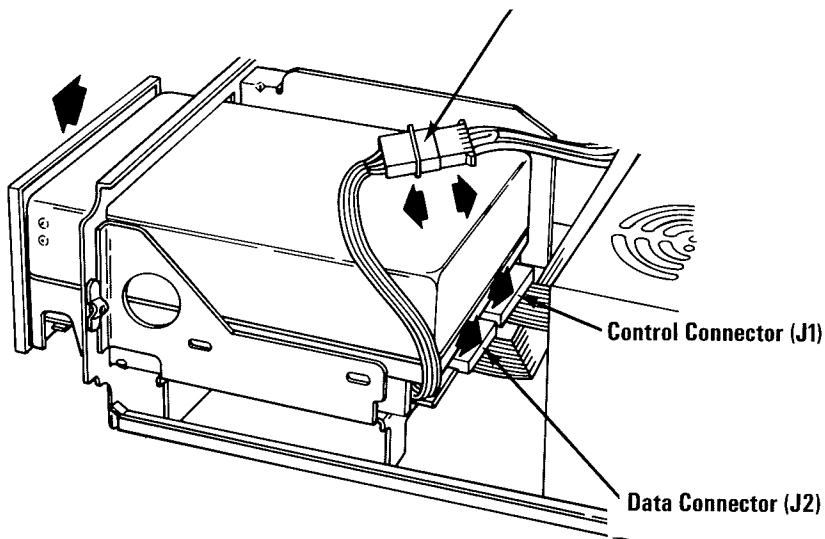
6. Unplug the power connector, control connector (J1), and data connector (J2). Then slide the drive completely out of the machine.



Type 1

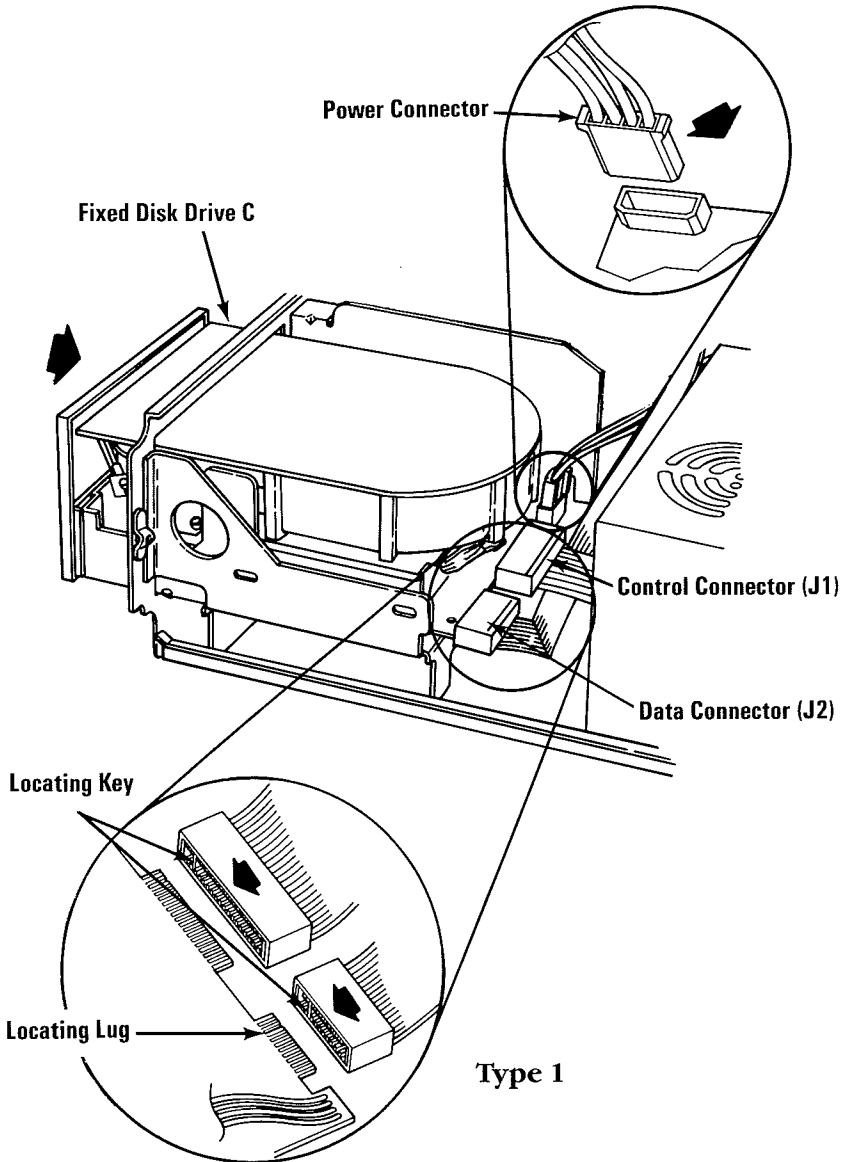
Fixed Disk Drive

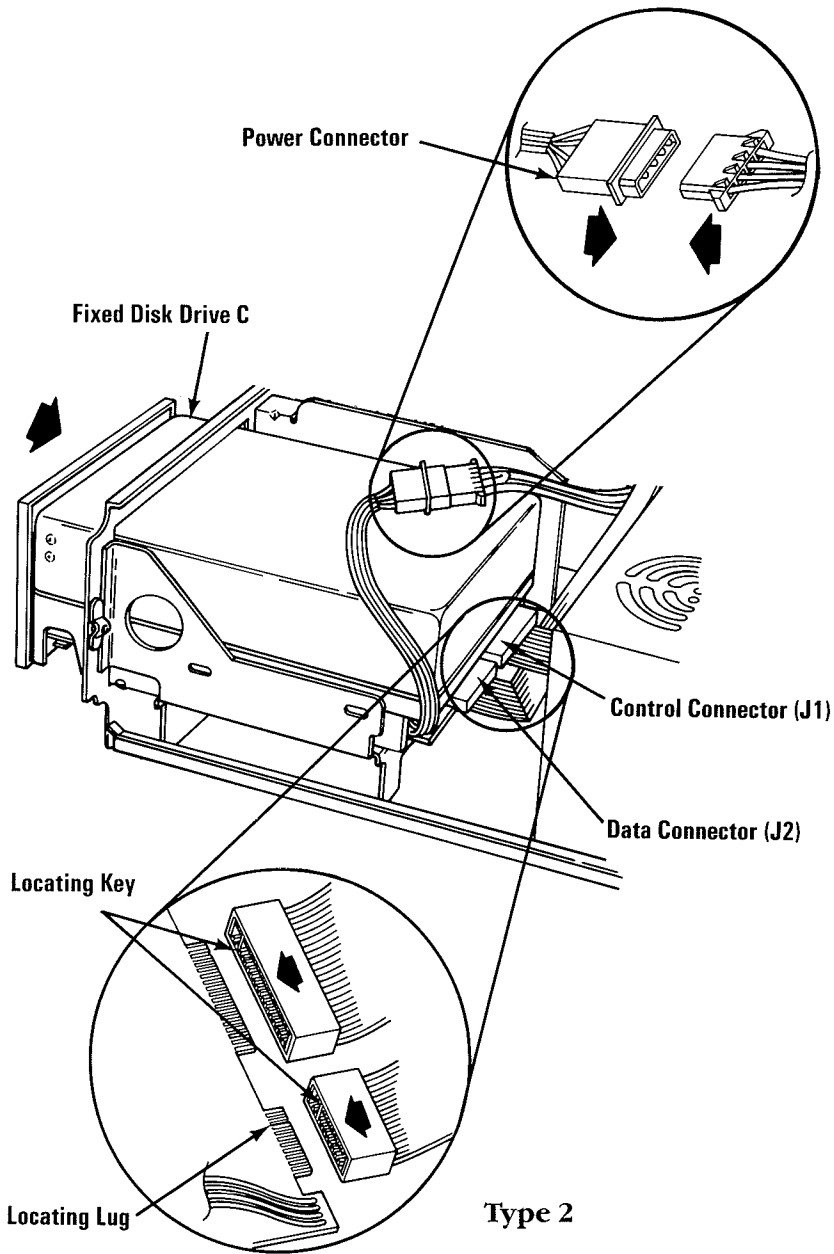
Power Connector



Type 2

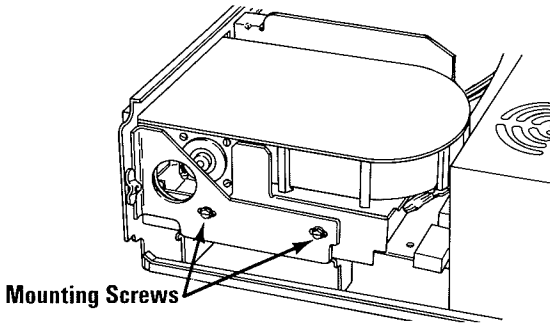
1. Slide the disk drive into slot C as shown below.
2. With the front of the drive still extending approximately two inches out of the front panel, plug in the power connector, control connector J1, and data connector J2.





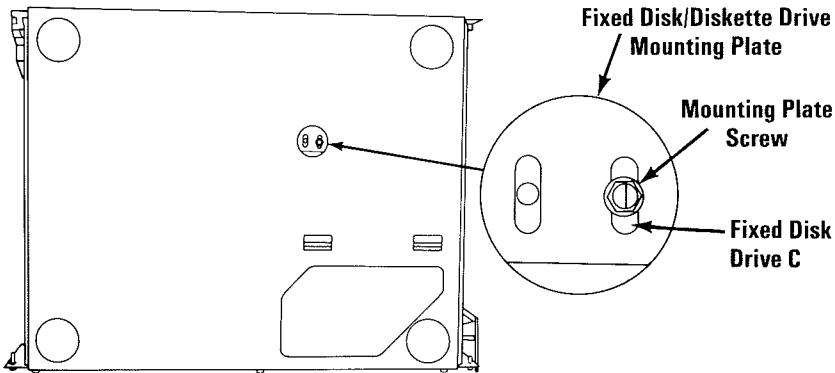
- Slide the disk drive in until there is .040" clearance between the front mounting panel and the drive face plate.
- Replace the disk drive mounting screws.

WARNING: Be sure to use the same two mounting screws (long screws) that were removed from the side of the drive or damage to the drive will result.



- Tilt the unit up and replace the fixed disk drive mounting plate screw as shown below.

WARNING: Be sure to use the same screw (short screw) that was removed from the mounting plate or damage to the drive will result.

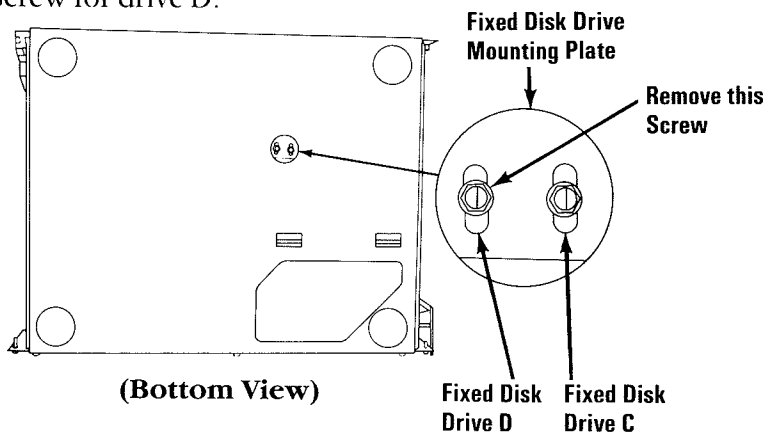


(Bottom View)

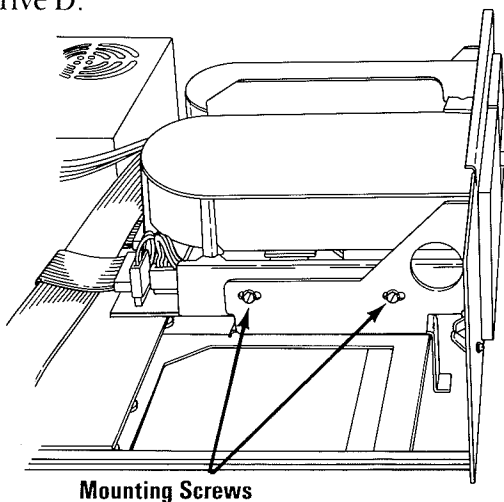
- Replace the expansion unit cover (5900).
- Reconnect cables to the expansion unit.

WARNING: Normal shipping and handling can result in permanent loss of all data and formatting on the fixed disk drive(s). It is recommended that all files be backed up onto diskettes.

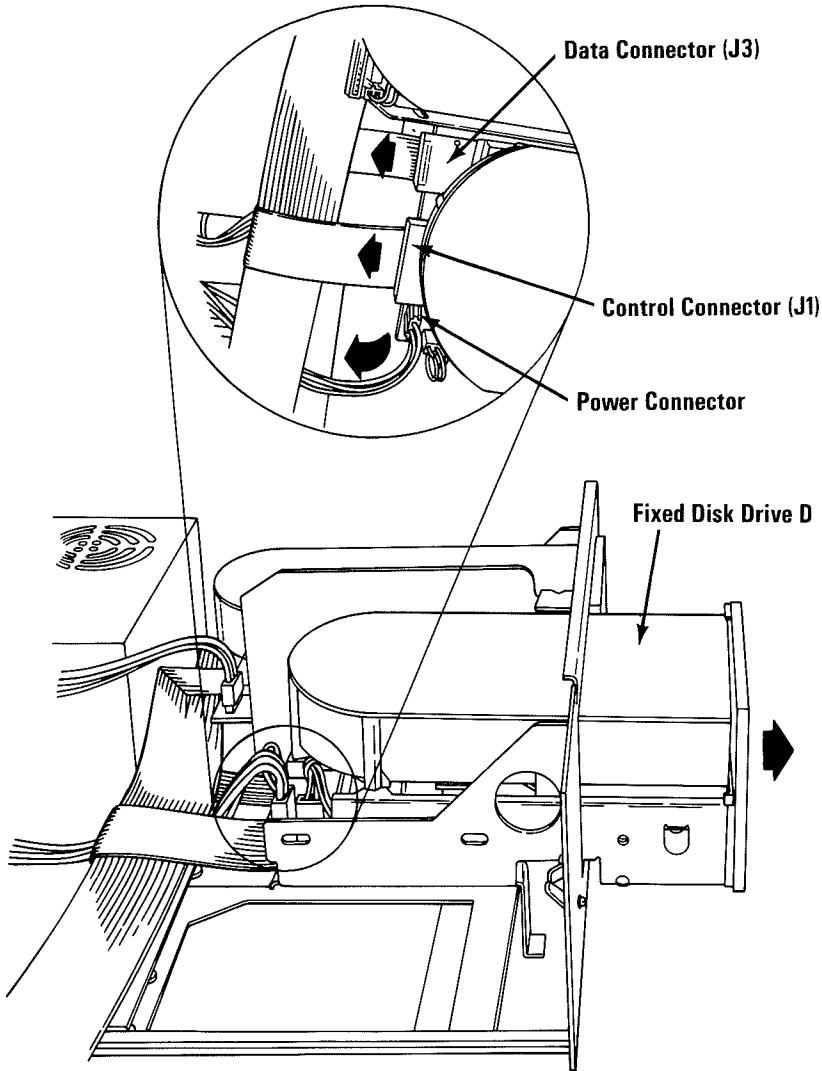
1. Set the expansion unit Power switch to Off, then unplug the expansion unit power cord and remove all cables from the rear of the unit.
2. Place all external options away from the work surface.
3. Remove the expansion unit cover (5900).
4. Tilt the unit up and remove the fixed disk mounting plate screw for drive D.



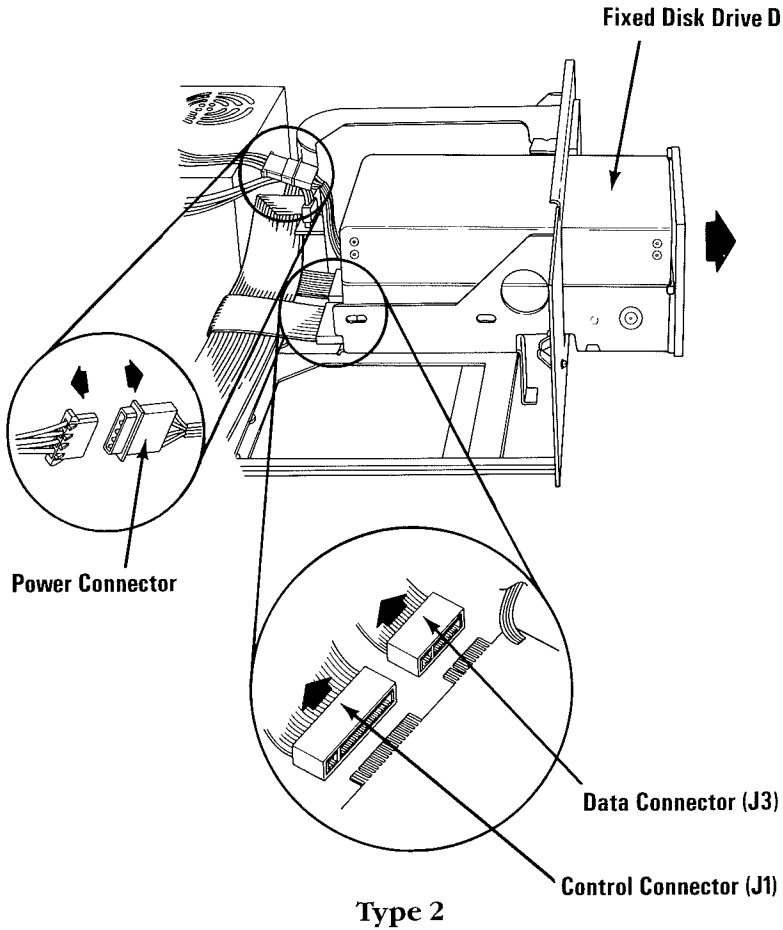
5. Remove all option adapters (5800).
6. Remove the mounting screws on the left side of disk drive D.



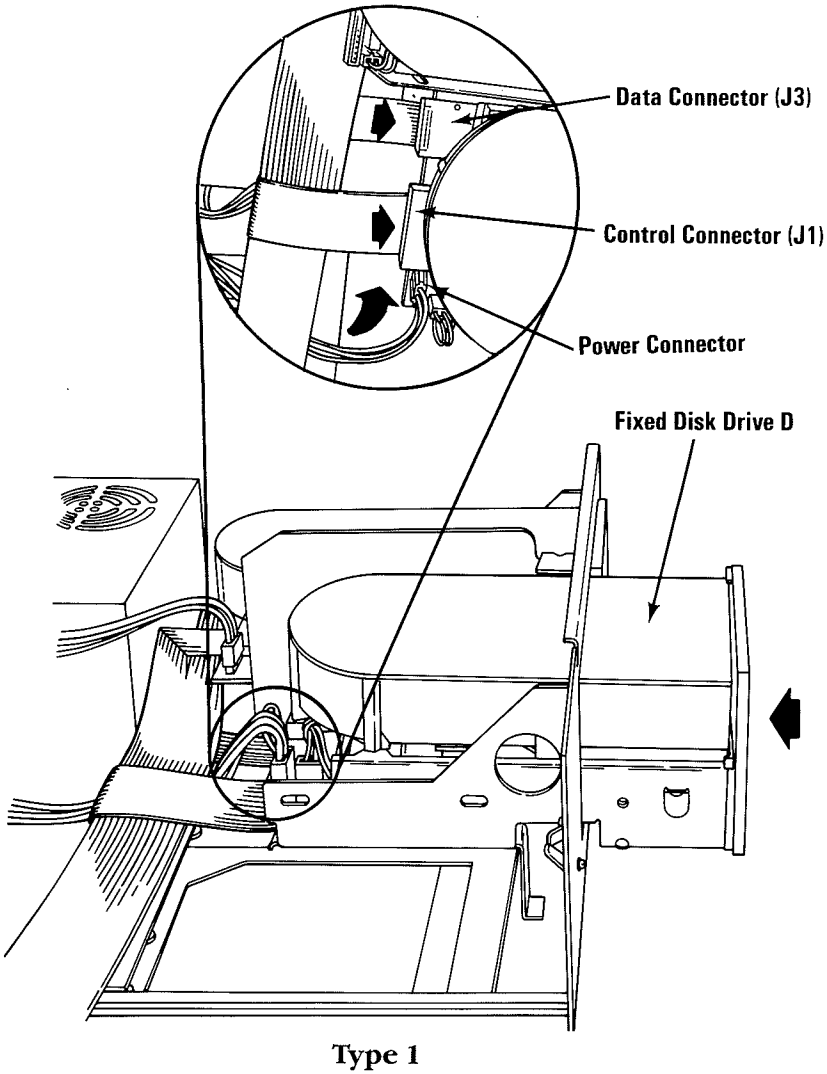
- 7. Slide the drive out two inches and unplug the control connector (J1), data connector (J3), and power connector.
- 8. Remove the disk drive from the unit.

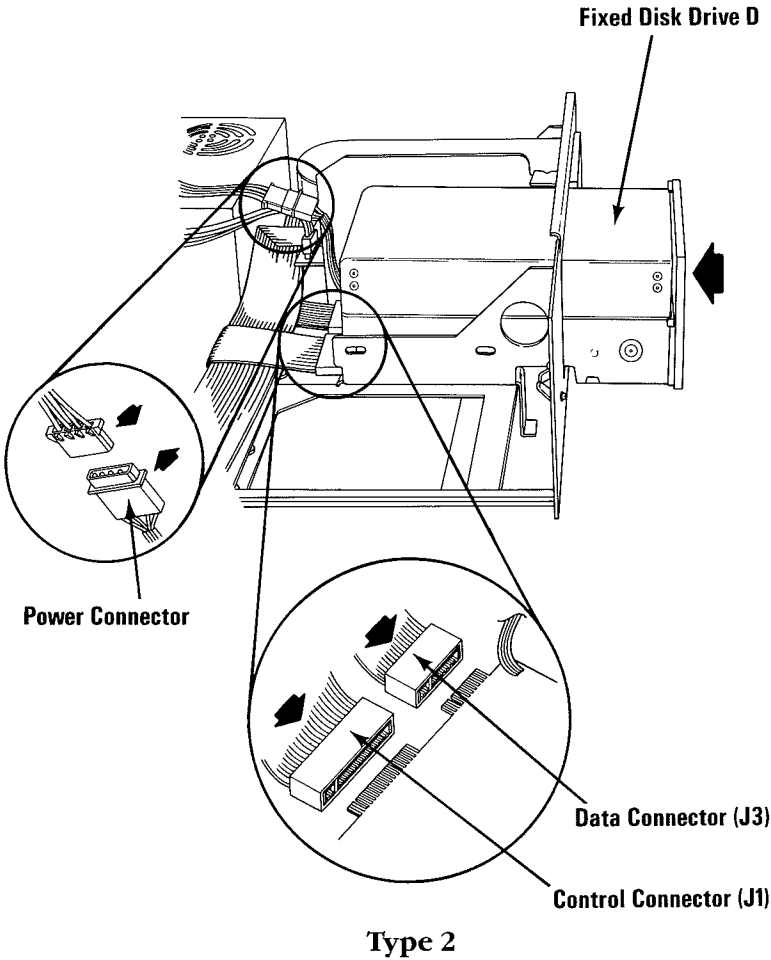


Type 1



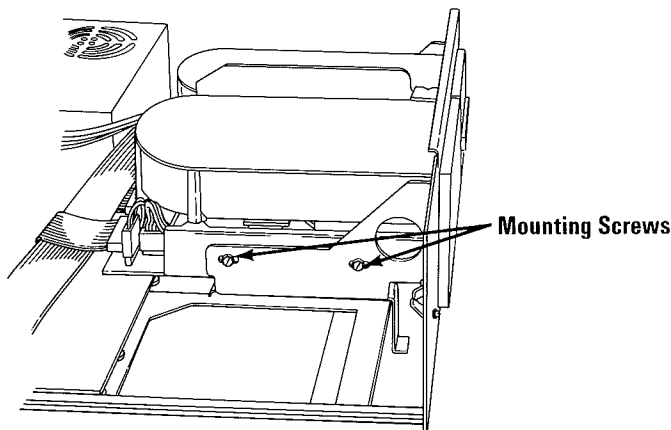
1. Slide the disk drive into slot D as shown.
2. With the front of the drive still extending approximately two inches out of the front panel, plug in the power connector, control connector (J1), and data connector (J3).





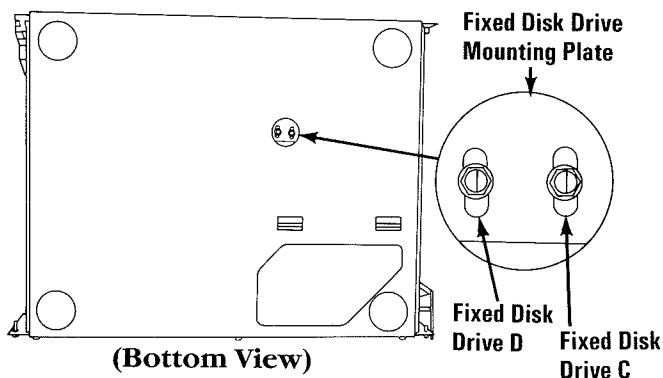
3. Slide the drive in until there is .040" clearance between the drive face plate and the front mounting panel.
4. Replace the two mounting screws.

WARNING: Be sure to use the same two mounting screws (long screws) that were removed from the side of the drive or damage to the drive will result.



5. Tilt the unit up and replace the fixed disk drive mounting plate screw as shown below.

WARNING: Be sure to use the same screw (short screw) that was removed from the mounting plate or damage will result.



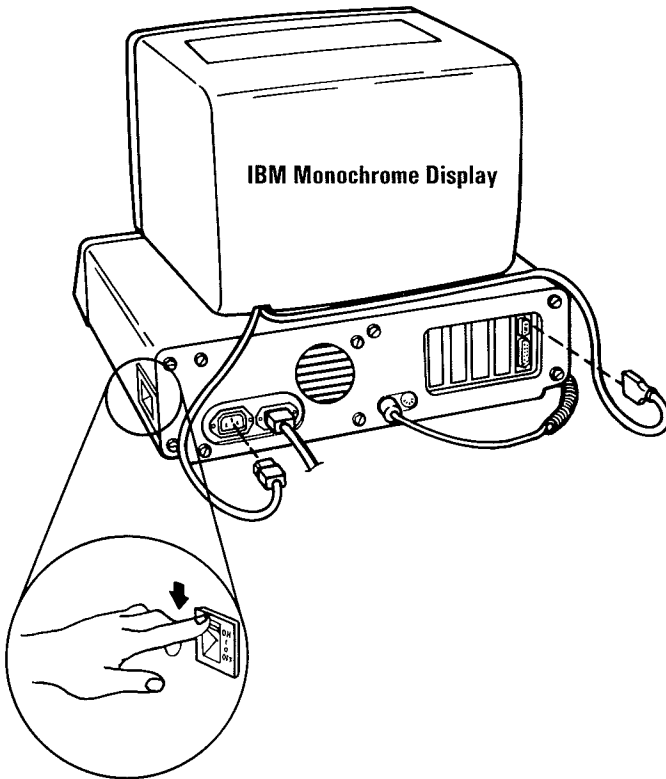
6. Replace all option adapters (5800).
7. Replace the expansion unit cover (5900).
8. Reconnect the cables.

Display

Monochrome Display Removal

5300

1. Set the system unit's Power switch to Off, and remove the display power cord from the rear of the system unit.
2. Disconnect the signal cable from the IBM Monochrome Display and Printer Adapter.



Display Replacement

5300

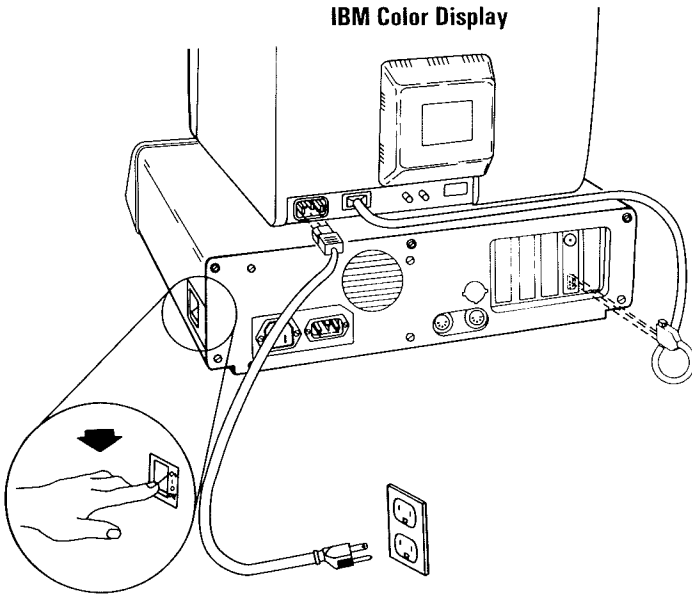
1. Connect the signal cable from your display to the IBM Monochrome Display and Printer Adapter.
2. Connect the display power cord to the connector at the rear of the system unit.

Color Display

Removal

5350

1. Set the system unit's Power switch (and expansion unit's Power switch, if attached) and the display's power control to Off.
2. Disconnect the display's power cord from the wall outlet.
3. Disconnect the display's signal cable from the Color/Graphics Monitor Adapter.
4. Disconnect the display's power cord from the rear of the display.



Color Display Replacement

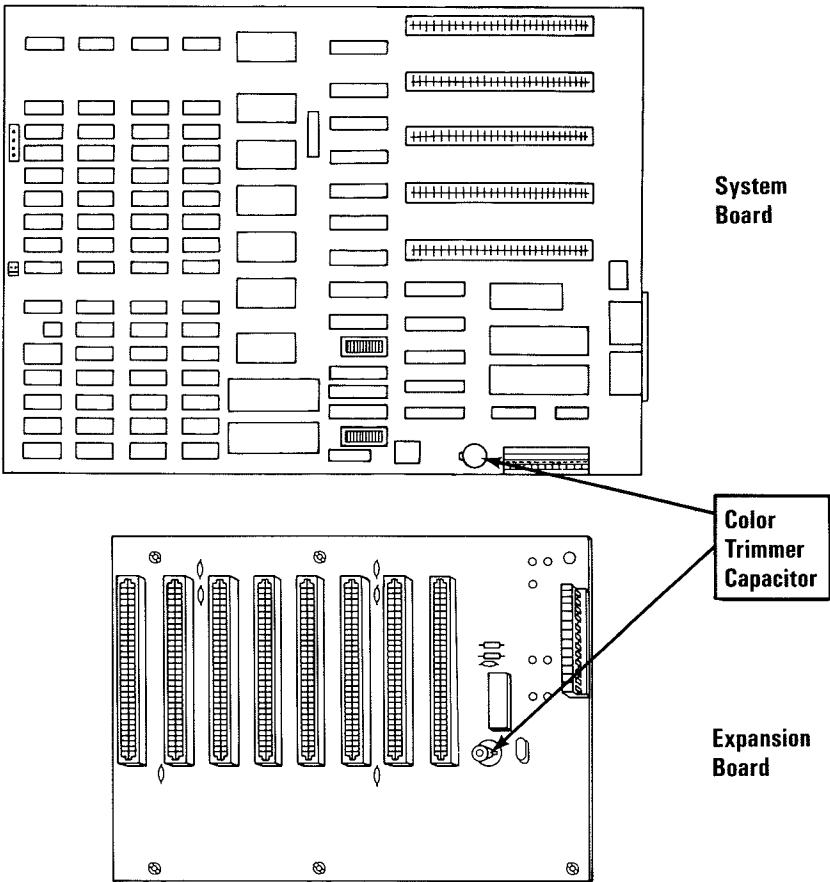
5350

1. Connect the signal cable from the display to the Color/Graphics Monitor Adapter.
2. Connect the display's power cord to the rear of the IBM Color Display.
3. Connect the display's power cord to the wall outlet.

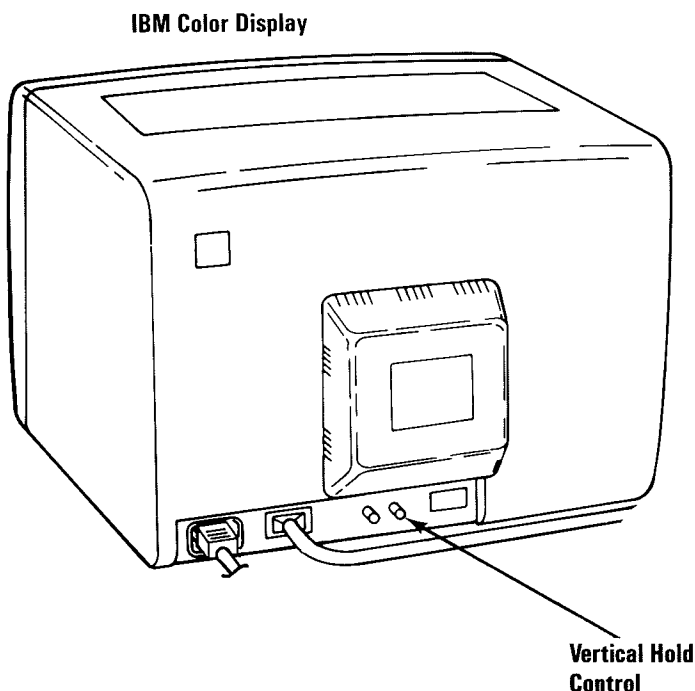
Color Trimmer Capacitor Adjustment

5360

If your display works correctly, except for an incorrect color hue or the absence of color, adjust, in small increments, the trimmer capacitor next to the power connectors on the system board until the color appears. If the Color/Graphics Monitor Adapter is installed in the expansion unit, the trimmer capacitor on the expansion board, next to expansion slot 8 should be adjusted (use only a nonmetallic screwdriver or aligning tool). The hue and color controls on the color monitor must also be set correctly at this point.

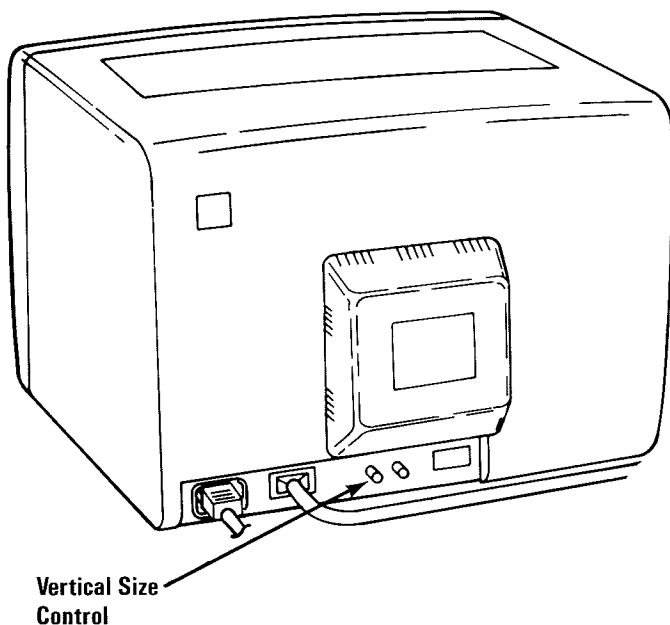


This adjustment is required only if your IBM Color Display has a vertical hold problem (screen rolling top-to-bottom or bottom-to-top).



1. Set the display's power control to on.
2. Set the expansion unit's Power switch to On, then set the system unit's Power switch to On.
3. Wait for POST to complete.
4. Turn the vertical hold control clockwise as far as it will go, then turn it counterclockwise until the screen stops rolling and is stable.

IBM Color Display



1. Set the system unit's Power switch (and expansion unit's Power switch, if attached) to Off.
2. Set the display's Power control to on.
3. Turn the brightness and contrast controls fully clockwise.
4. Turn the vertical size control fully counterclockwise. A black area should appear across the top and bottom of the screen.
5. Turn the vertical size control clockwise until the black area at the top and bottom of the screen just disappears. If one of the black areas disappears before the other, continue to turn the control until the second black area is gone.
6. Adjust the brightness and contrast controls for eye comfort.

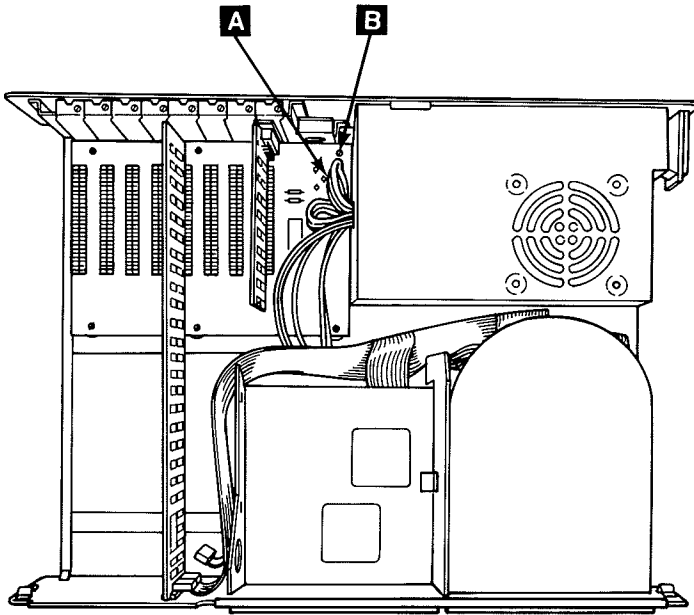
Notes:

Expansion Unit

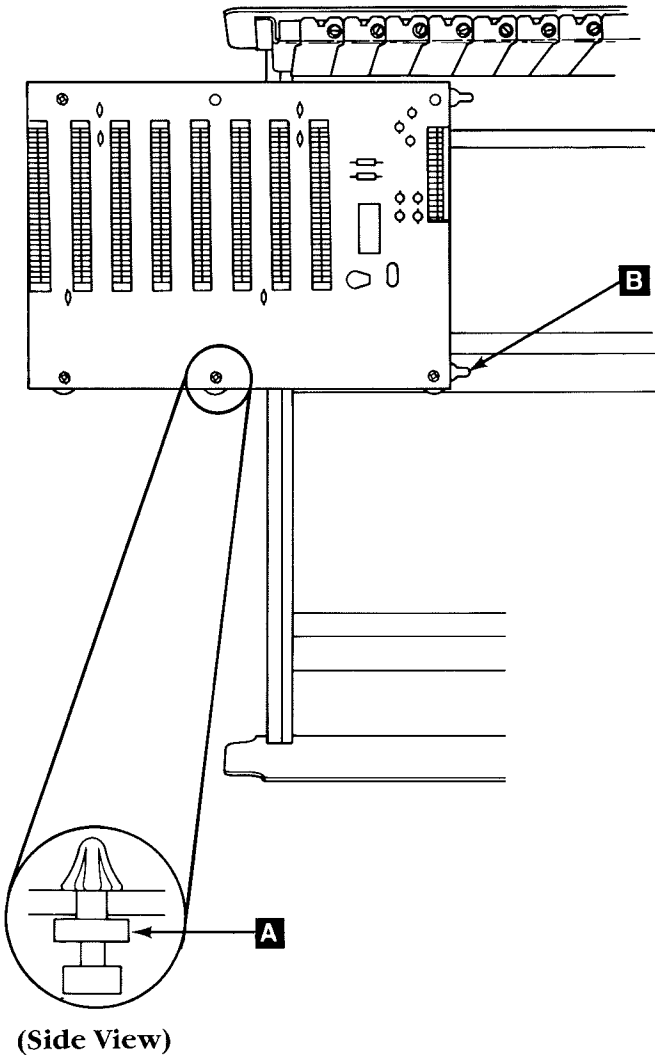
Expansion Board Removal

5410

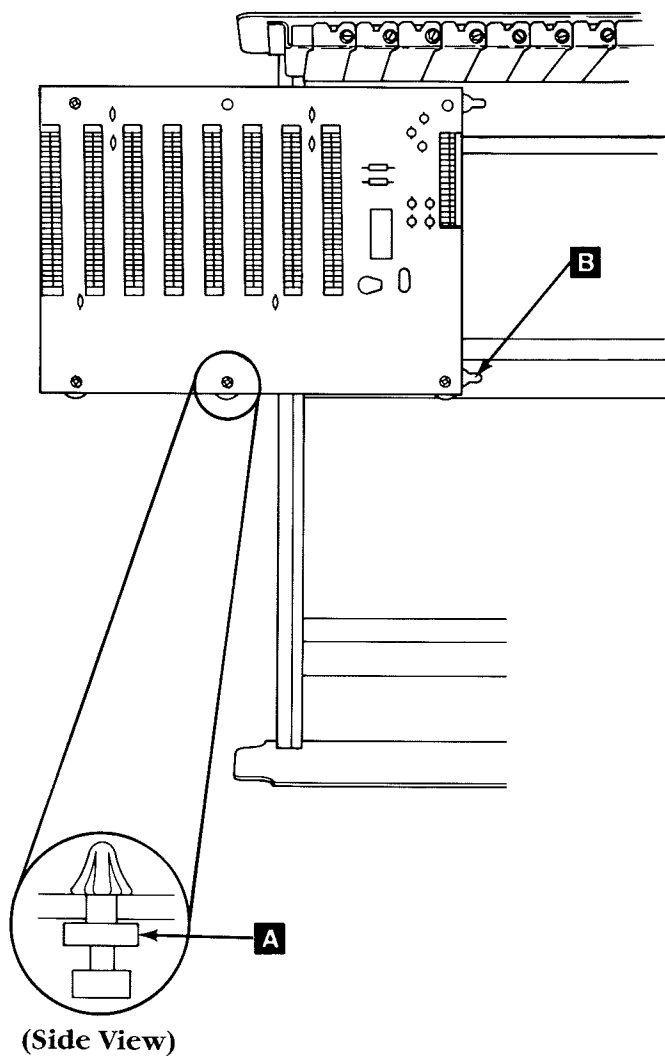
1. Set the system unit and the expansion unit Power switches to Off, unplug the expansion unit power cord and disconnect all cables from the rear of the expansion unit.
2. Remove expansion unit cover (5900).
3. Remove all option adapters, including the receiver card (5800).
4. Remove expansion board power connectors **A**.
5. Remove expansion board mounting screw **B**.



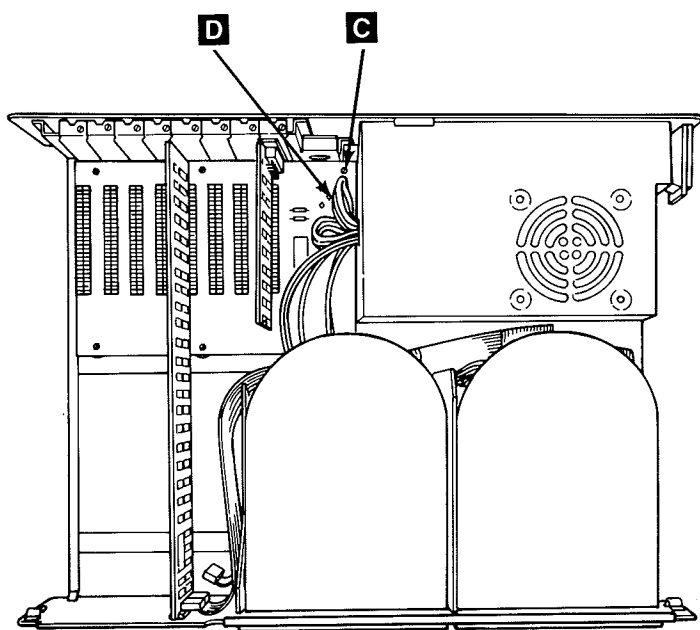
- Slide expansion board away from the power supply (approximately 1/2") until stand-offs **A** can be lifted from mounting slots **B**.
- Lift expansion board up and out of expansion unit.



1. Position the stand-offs **A** on the expansion board into the mounting slots **B**.



2. Slide expansion board toward power supply until holes for mounting screws are aligned.
3. Install expansion board mounting screw **C**.
4. Install expansion board power connectors **D**.
5. Install option adapters, including the receiver card (5800).
6. Install expansion unit cover (5900).

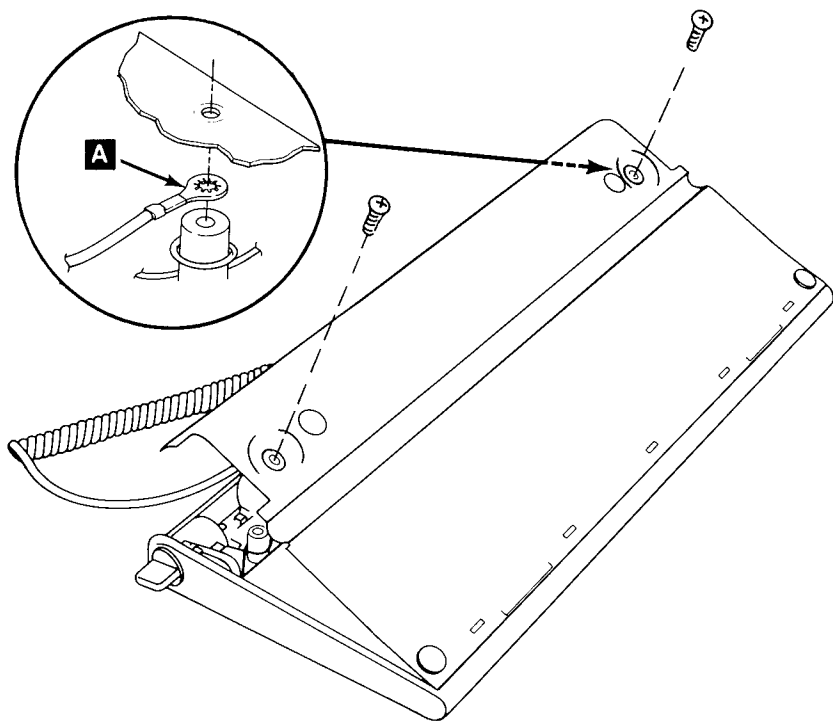


Keyboard

Keyboard Base Removal

5500

1. Set system unit Power switch to Off, and disconnect keyboard cable from rear of system unit.
2. Position the keyboard with the bottom facing up and remove the two mounting screws.
3. Rotate the base up and out of the front retaining slots.

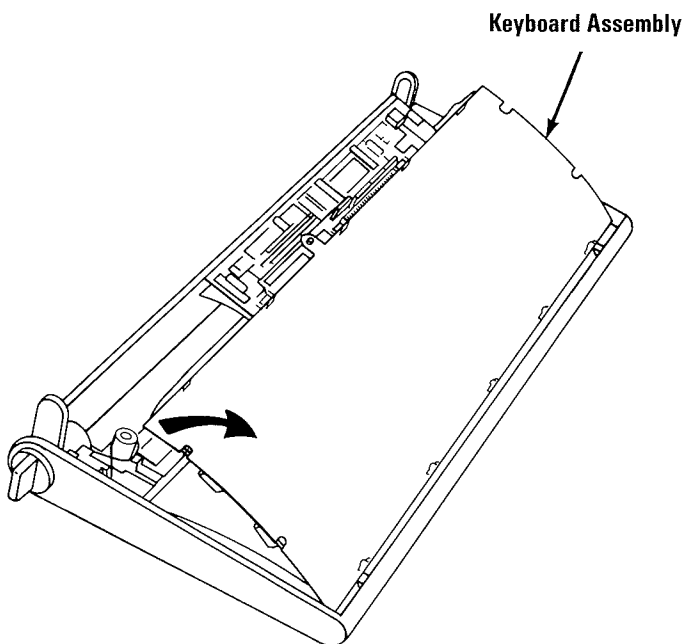


Keyboard Base Replacement

5500

1. Place the tabs on front of base into retaining slots on cover and rotate base to closed position.
2. Replace mounting screws with ground wire **A** installed on screw post as shown.
3. Reconnect keyboard cable at rear of system unit.

1. Set system unit Power switch to Off, and disconnect keyboard cable from rear of system unit.
2. Remove keyboard base (**5500**).
3. Disconnect cable from keyboard assembly.
4. Lift rear of keyboard assembly up and then out of the cover.



Keyboard Assembly Replacement

5510

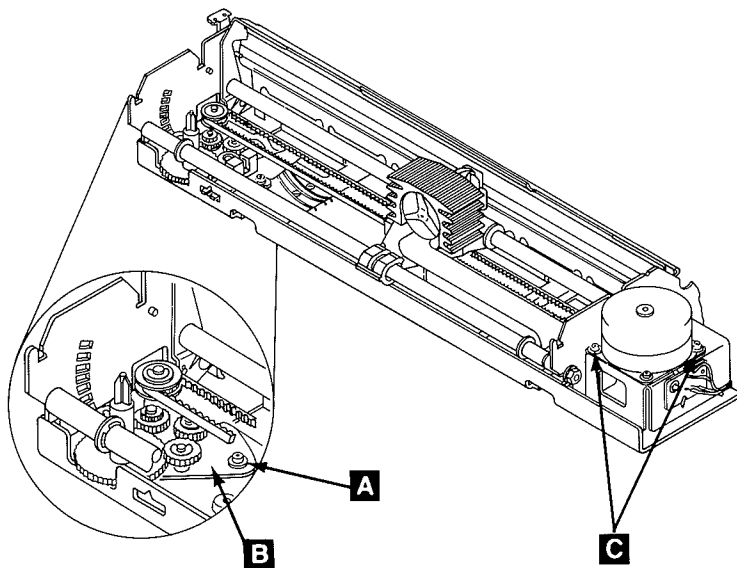
1. Place front of keyboard assembly into cover.
2. Lower rear of keyboard assembly into position in cover.
3. Replace keyboard base (**5500**).
4. Reconnect keyboard cable at rear of system unit.

Printer (IBM 80 CPS Matrix Printer)

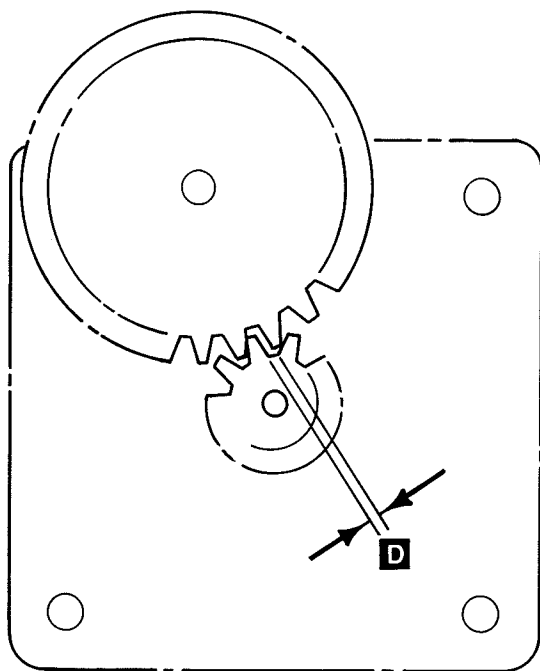
Carriage Belt Adjustment

5600

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove ribbon cartridge.
6. Remove top cover (5630).
7. Loosen holddown screw **A** in carriage drive assembly.
8. Pivot carriage drive assembly **B** to the left to tighten belt.
9. Tighten holddown screw.
10. Loosen screws **C** in carriage motor mounts.

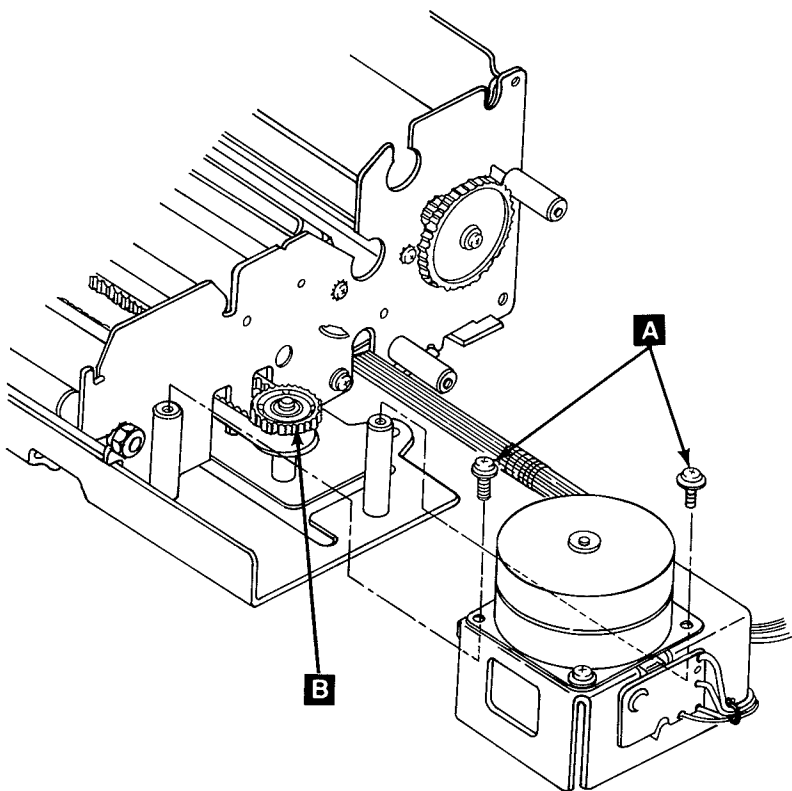


11. Position carriage motor so that motor and drive gears mesh.
12. Adjust gear backlash **D** for minimum.

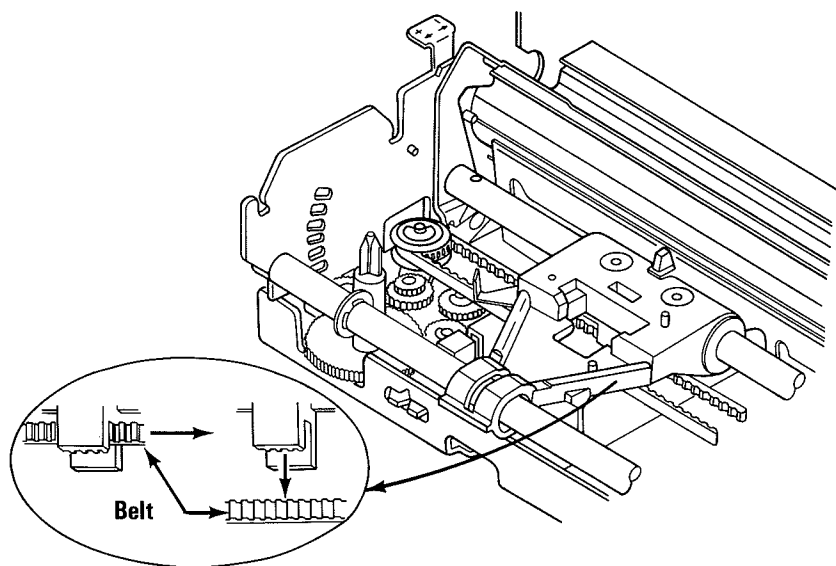


13. Tighten motor mounts screws.
14. Move print head back and forth to check for smooth gear operation with no binding.

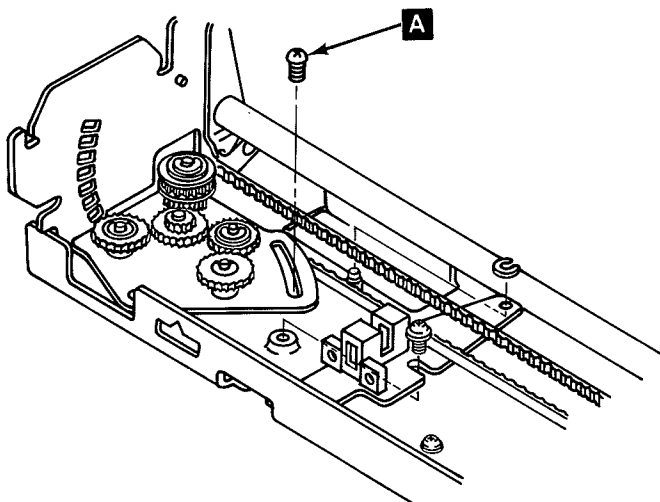
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove ribbon cartridge.
6. Remove top cover (5630).
7. Remove left front and right rear screws from carriage motor mounts **A**.
8. Lift motor away from mounts to expose belt pulley **B**.



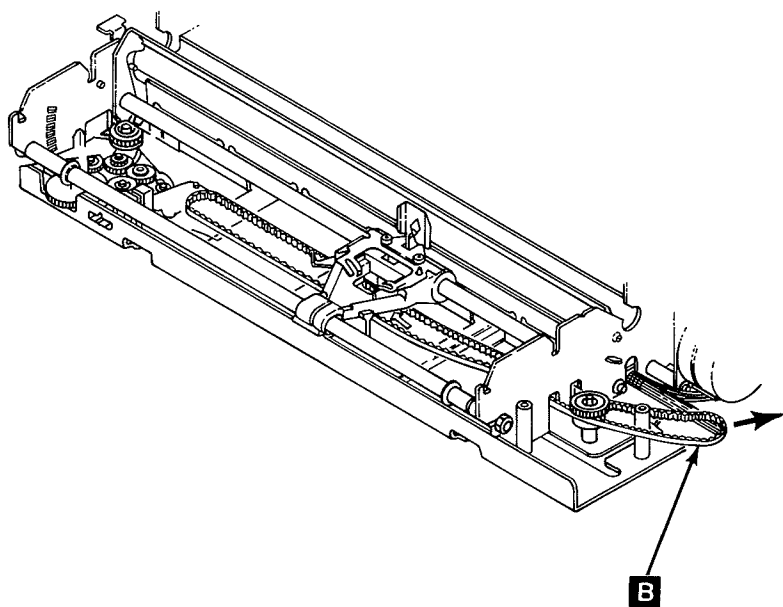
9. Pull belt from clip underneath print head carriage by pulling down on belt.



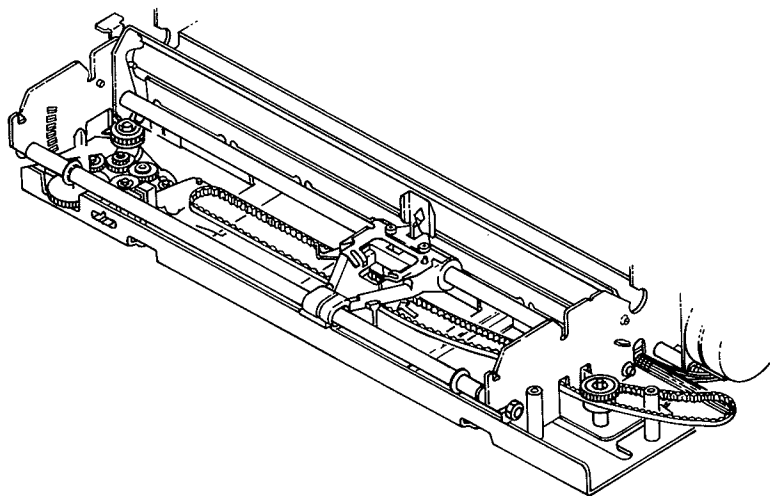
10. Loosen screw in slot in carriage drive assembly **A**.
11. Pivot carriage drive assembly to right.



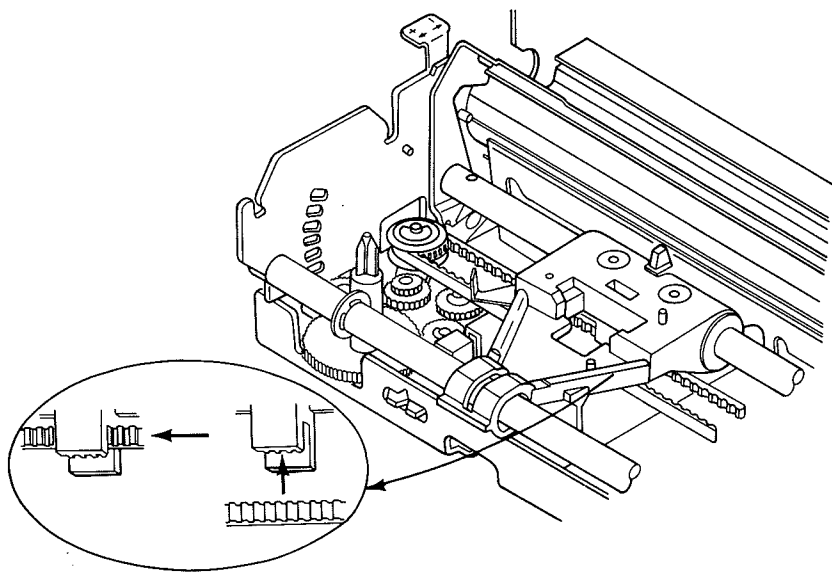
12. Lift belt off pulley at each end.
13. Guide belt **B** through opening in right side of print mechanism assembly frame.



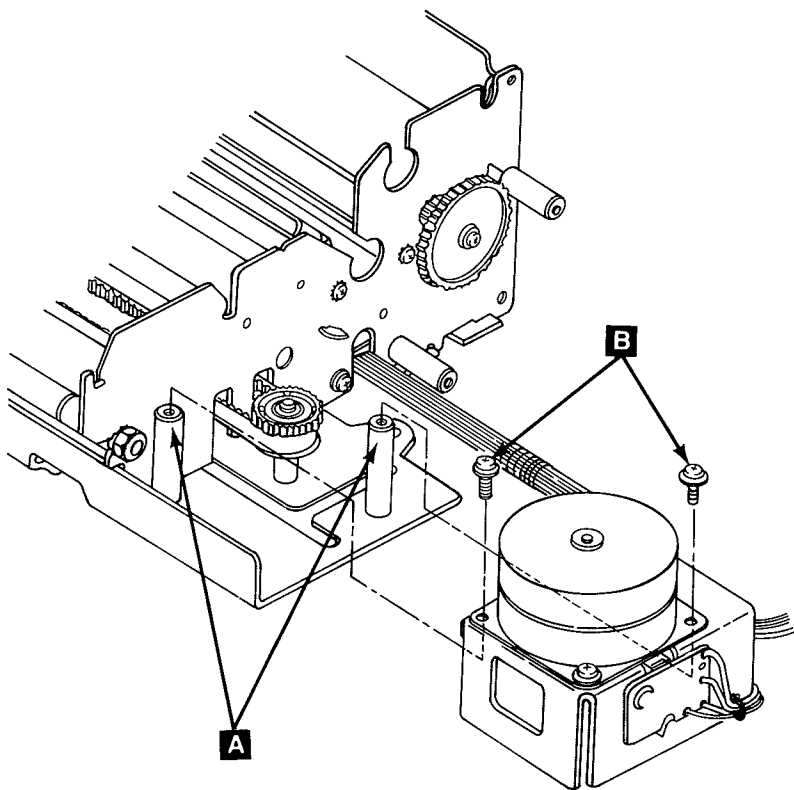
1. Insert belt through opening in right side of frame of print mechanism assembly.
2. Guide belt along base toward carriage drive assembly.



3. Place belt onto pulleys at both ends.
4. Insert belt into retaining clip under the print head carriage.



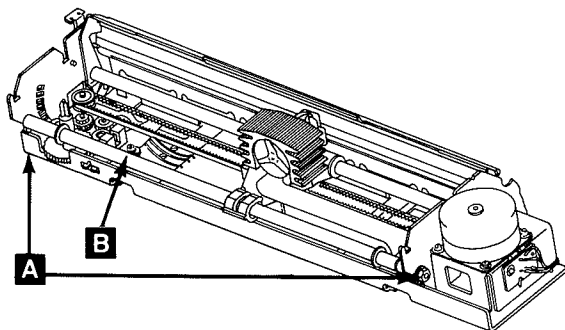
5. Place carriage motor onto motor mounts **A**.
6. Install screws into motor base (do not tighten) **B**.



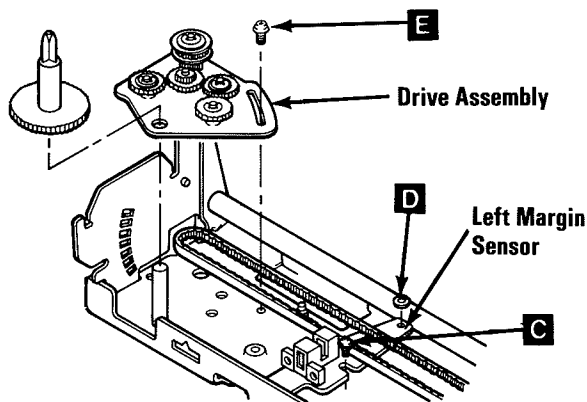
7. Perform carriage belt adjustment (5600).
8. Replace top cover (5630).
9. Replace ribbon cartridge.
10. Replace access cover (5630).
11. Replace forms rack (5640).

Carriage Drive Assembly Removal 5605

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove ribbon cartridge.
6. Remove top cover (5630).
7. Move carriage to right side of frame.
8. Loosen nuts **A** on carriage shaft **B** and pivot left end of shaft to front.



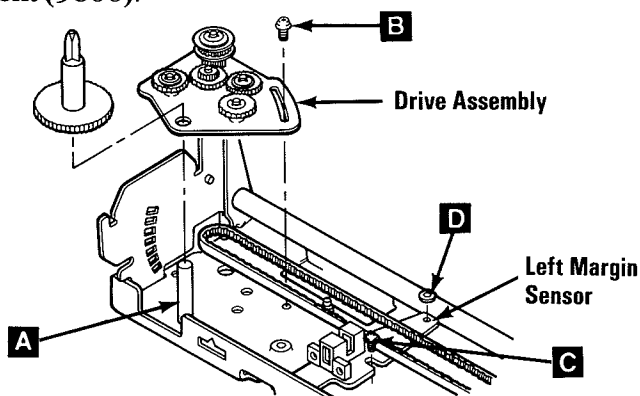
9. Remove screw **C** and clamp **D** from left margin sensor.
10. Remove carriage drive assembly retaining screw **E**.
11. Pivot carriage drive assembly clockwise, lift belt off drive pulley, lift left margin sensor off post, and lift carriage drive assembly from machine.



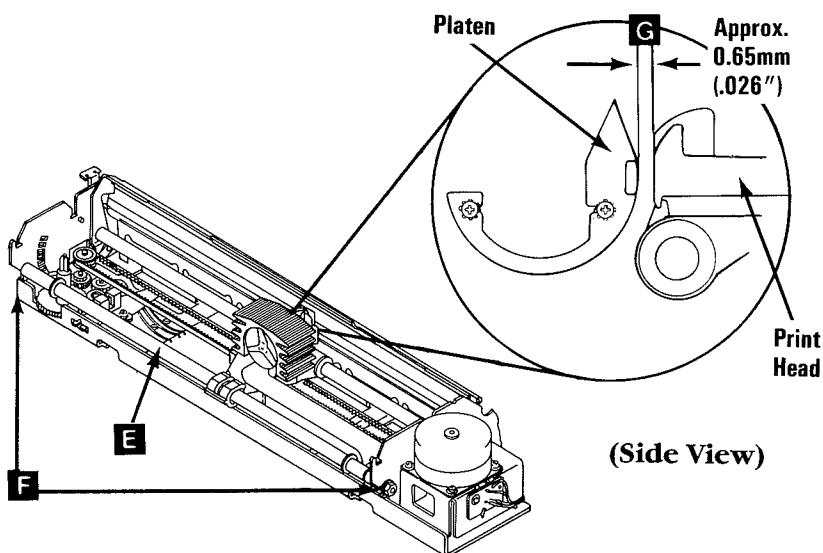
Carriage Drive Assembly Replacement

5605

1. Position carriage drive assembly by inserting post **A** through pivot hole.
2. Replace carriage drive assembly retaining screw **B**.
3. Replace left margin sensor, screw **C**, and clip **D**.
4. Place belt over drive pulley and perform carriage belt adjustment (5600).



5. Pivot carrier shaft **E** into the slots on frame. Tighten nuts **F**.
6. Check print head gap **G**. Adjust if necessary (5680).



Carriage Drive Assembly Replacement (cont.)

5605

7. Perform left margin sensor adjustment (**5670**).
8. Replace top cover (**5630**).
9. Replace ribbon cartridge.
10. Replace access cover. (**5630**).
11. Replace forms rack (**5640**).

Before replacing the control circuit card, check the printer DIP switch settings. Be sure the problem is not caused by an improper DIP switch setting.

Note: Graphics printer Switch No. 1-7 must be set for local requirements. This switch selects Table 1 or 2 and is factory set to Off for U.S. English speaking countries.

Functions and conditions of Dip Switch No. 1

Graphics Printer

Switch No.	Function	On	Off	Factory Set
1-1	Not Applicable	—	—	On
1-2	CR	Print Only	Print & Line Feed	On
1-3	Buffer Full	Print Only	Print & Line Feed	Off
1-4	Cancel Code	Invalid	Valid	Off
1-5	Not Applicable	—	—	On
1-6	Error Buzzer	Sound	Does Not Sound	On
1-7	Character Generator	Table 2	Table 1	Off
1-8	Select In Signal	Fixed Internally	Not Fixed Internally	On

Matrix Printer

Switch No.	Function	On	Off	Factory Set
1-1	Not Applicable	—	—	On
1-2	CR	Print Only	Print & Line Feed	On
1-3	Buffer Full	Print Only	Print & Line Feed	On
1-4	Cancel Code	Invalid	Valid	Off
1-5	Delete Code	Invalid	Valid	On
1-6	Error Buzzer	Sound	Does Not Sound	On
1-7	Character Generator	N.A.	Graphic Pattern Select	Off
1-8	Select In Signal	Fixed Internally	Not Fixed Internally	On

Functions and Conditions of Dip Switch No. 2

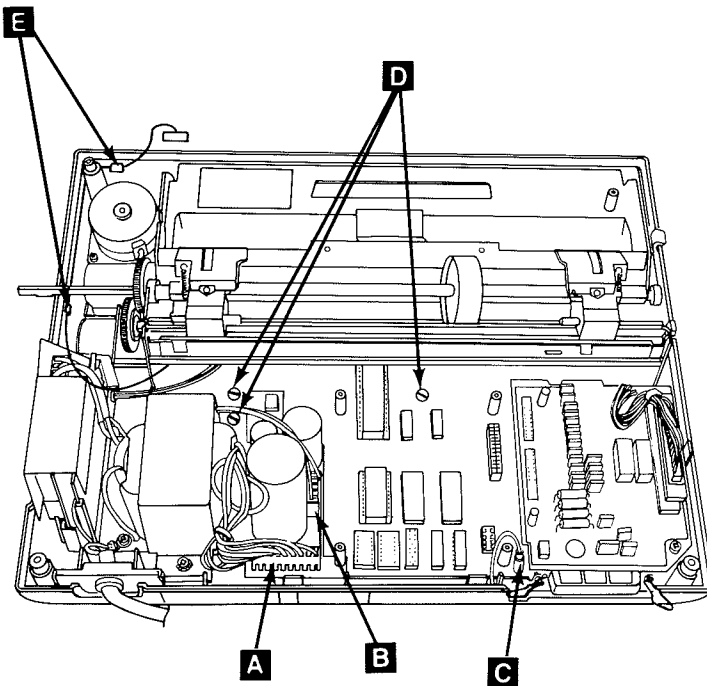
Graphics Printer

2-1	Form Length	12"	11"	Off
2-2	Line Spacing	1/8"	1/6"	Off
2-3	Auto Feed XT Signal	Fixed Internally	Not Fixed Internally	Off
2-4	1 in. Skip Over Perforation	Valid	Not Valid	Off

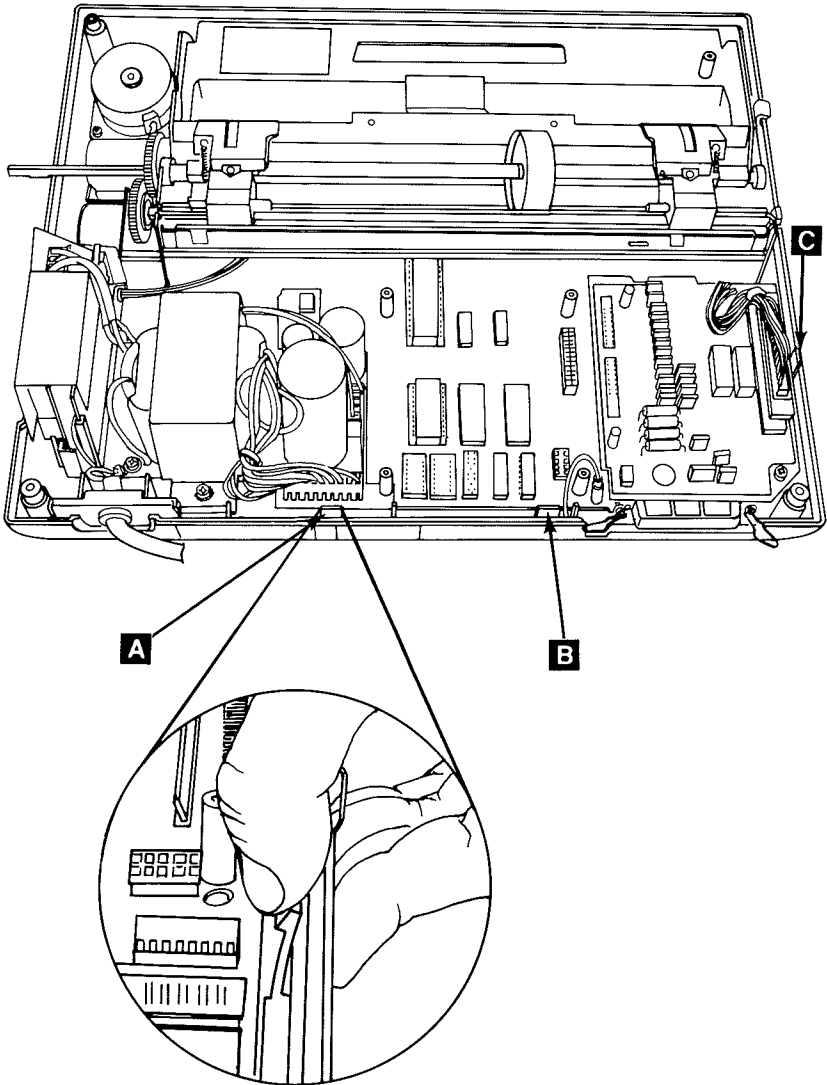
Matrix Printer

2-1	Not Applicable	—	—	On
2-2	Not Applicable	—	—	On
2-3	Auto Feed XT Signal	Fixed Internally	Not Fixed Internally	Off
2-4	Coding Table Select	N.A.	Standard	Off

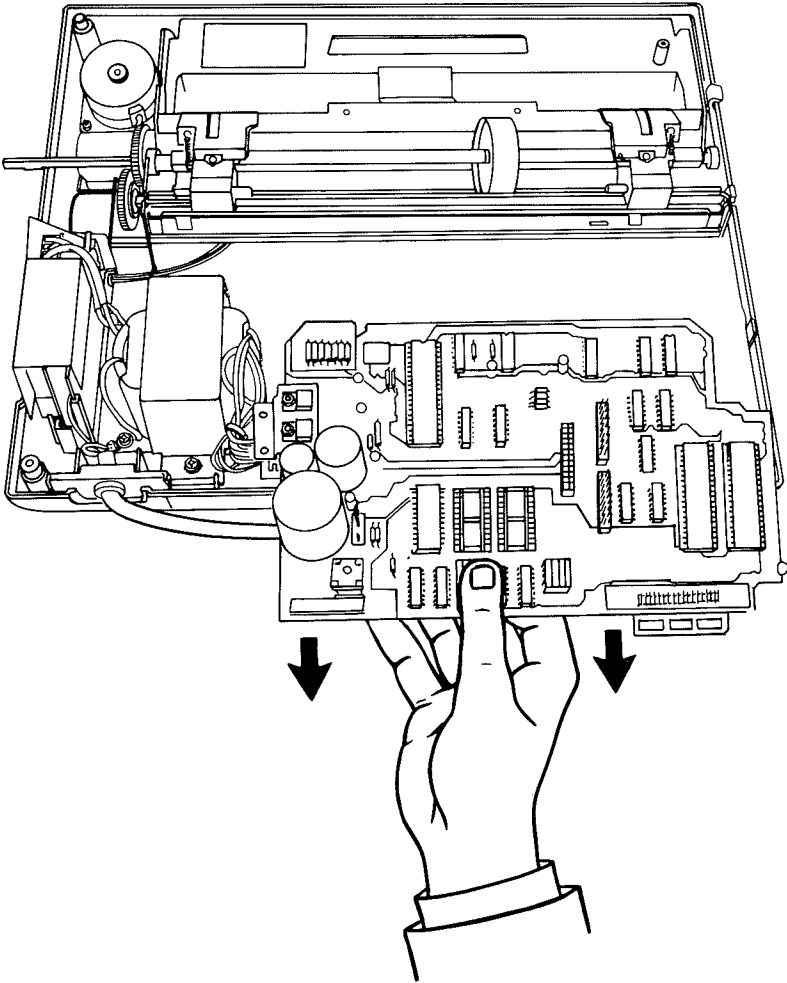
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Remove driver circuit card (5620).
7. Unplug connector CN2. **A**
8. Unplug connector CN6. **B**
9. Unplug ground wire. **C**
10. Remove three screws. **D**
11. Pull control panel cable from under retaining clips. **E**



12. Press three tabs **A** , **B** , and **C** . Lift card clear of tabs.

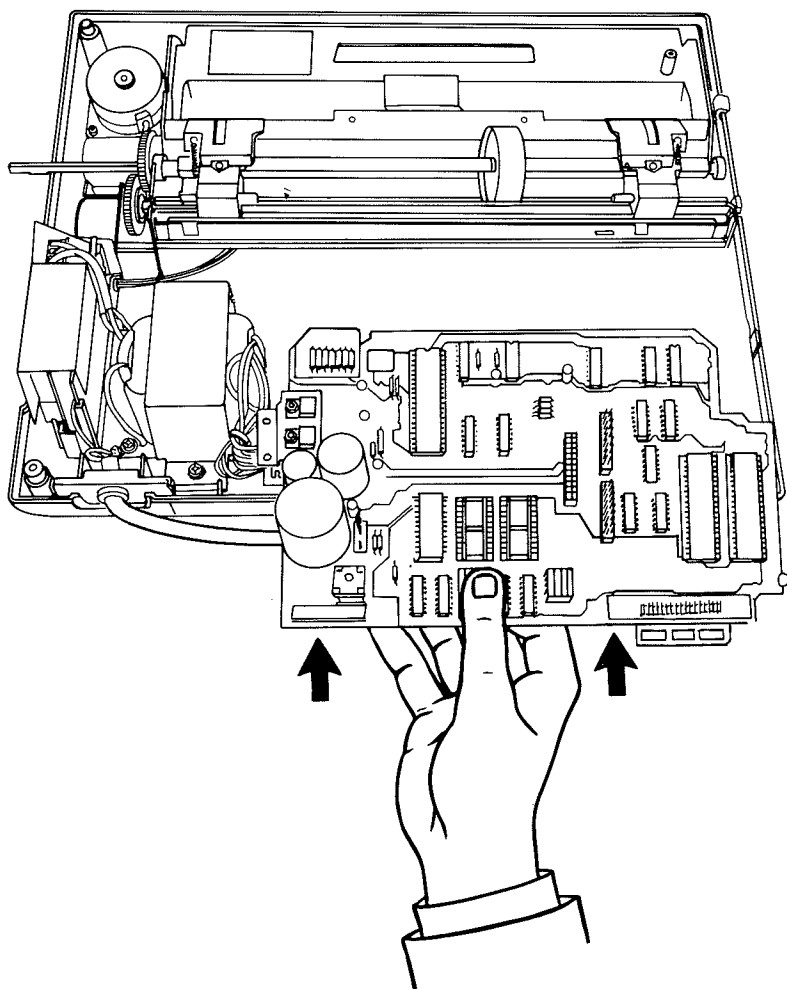


13. Lift control circuit card to clear the six posts. Carefully pull control circuit card away from print mechanism assembly.



Control Circuit Card Replacement 5615

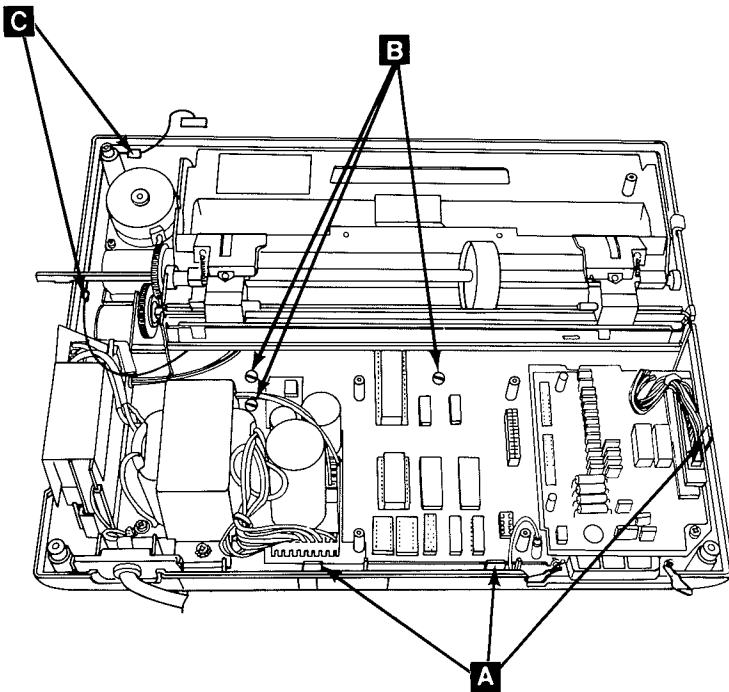
1. Guide control circuit card into open area behind print mechanism assembly.



Control Circuit Card Replacement (cont.)

5615

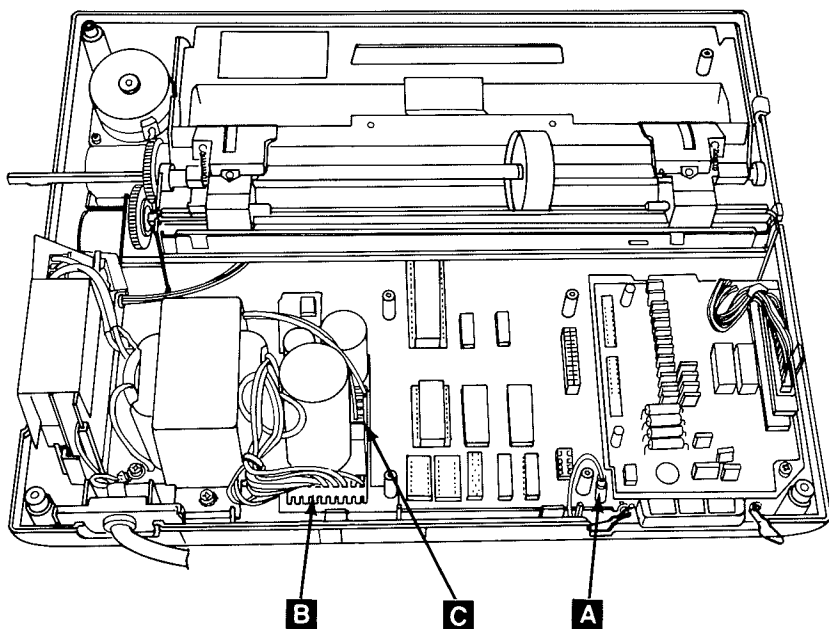
2. Align six holes in control circuit card with six posts in base cover.
3. Lower control circuit card onto base cover and snap the three retaining tabs **A** into place.
4. Install 3 hold down screws **B**.
5. Guide control panel cable along right side of base cover and around to front.
6. Place control panel cable under two retaining clips **C**.



Control Circuit Card Replacement (cont.)

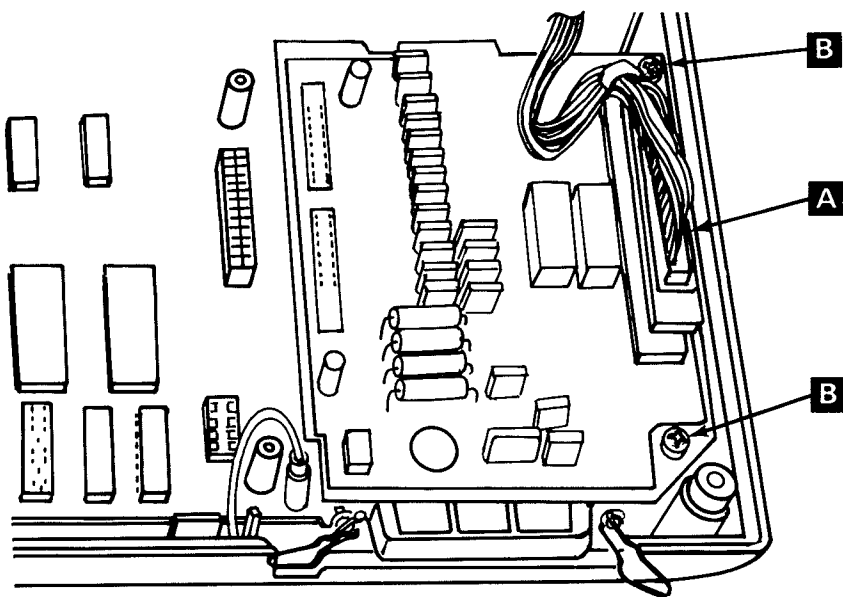
5615

7. Connect ground wire. **A**
8. Install connector CN2. **B**
9. Install connector CN6. **C**

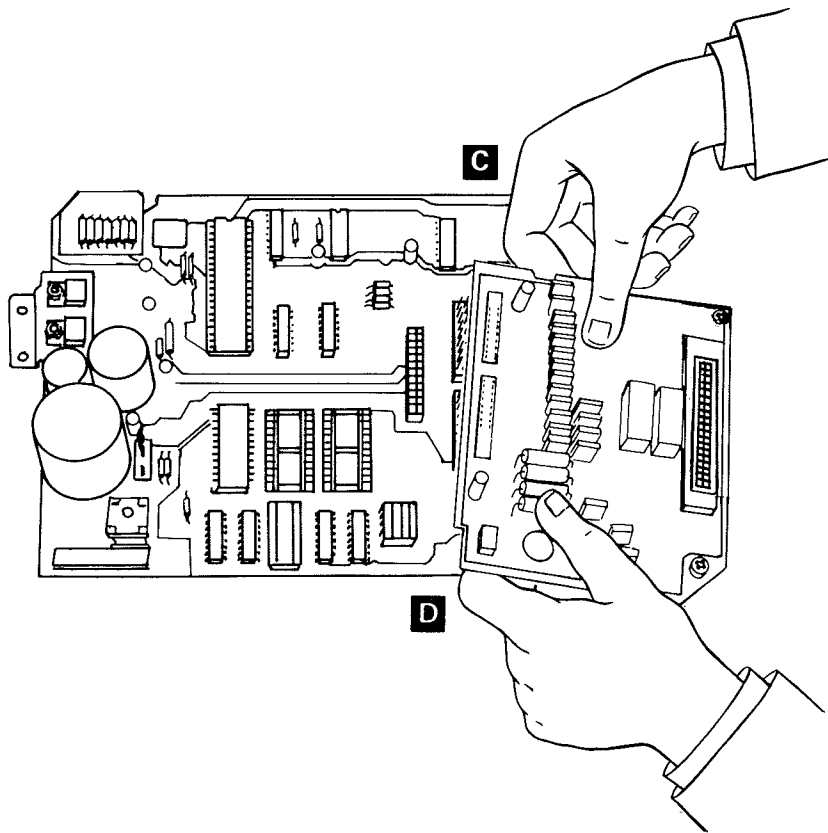


10. Replace driver circuit card (5620).
11. Replace top cover. (5630).
12. Replace access cover. (5630).
13. Replace forms rack. (5640).

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Unplug connector CN6. **A**
7. Remove two screws. **B**



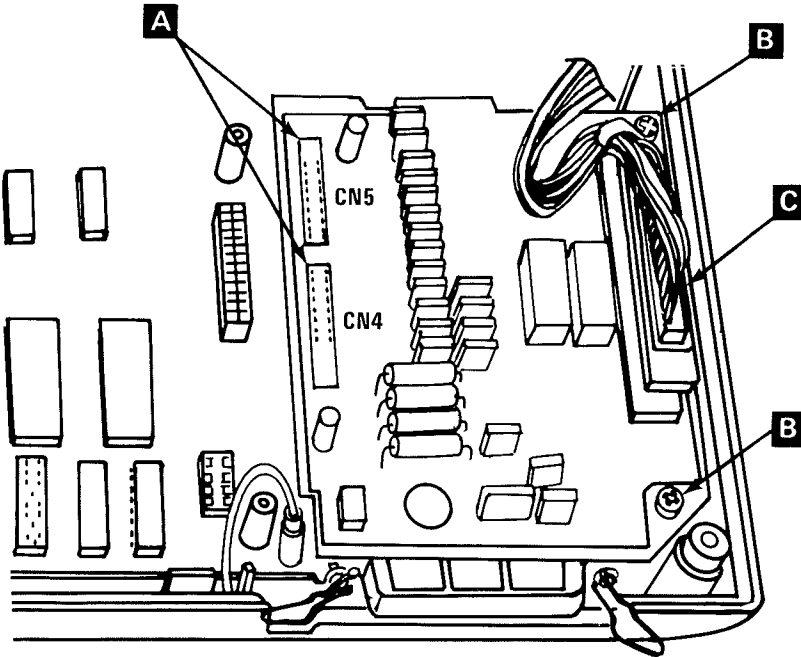
8. Disconnect driver circuit card from control circuit card at CN4 and CN5. Lift at **C** , then at **D** .



1. Align two connectors CN4 and CN5 **A** on bottom of driver circuit card with connectors CN4 and CN5 on control circuit card.

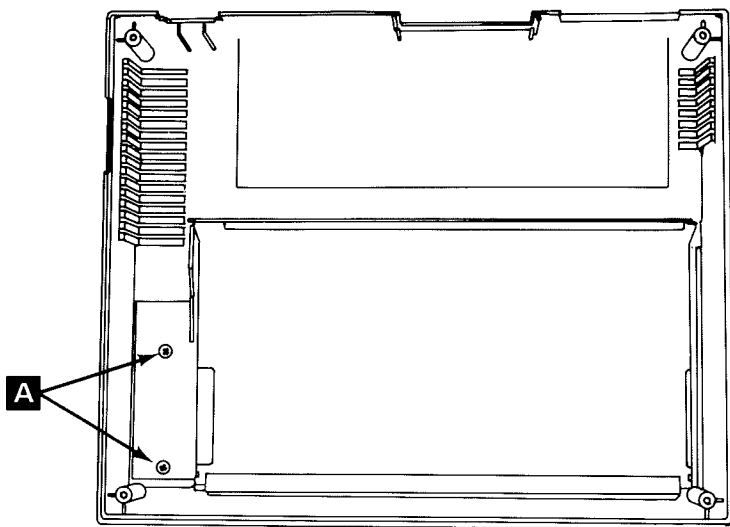
CAUTION: CN4 and CN5 are not keyed. Verify proper alignment before powering on to prevent circuit card damage.

2. Connect driver circuit card to control circuit card by pressing down firmly on connectors. Be sure to guide connector CN6 cable into slot on left front edge of driver circuit.
3. Install two screws **B**.
4. Install connector CN6 **C**.



5. Replace top cover (5630).
6. Replace access cover (5630).
7. Replace forms rack (5640).

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Invert top cover.
7. Remove 2 screws **A** from underside of top cover.

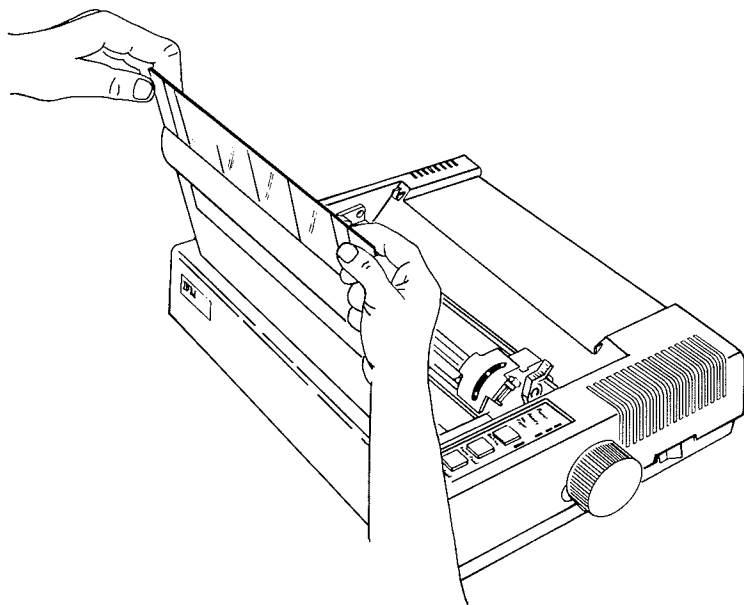


8. Lift control panel from top cover.

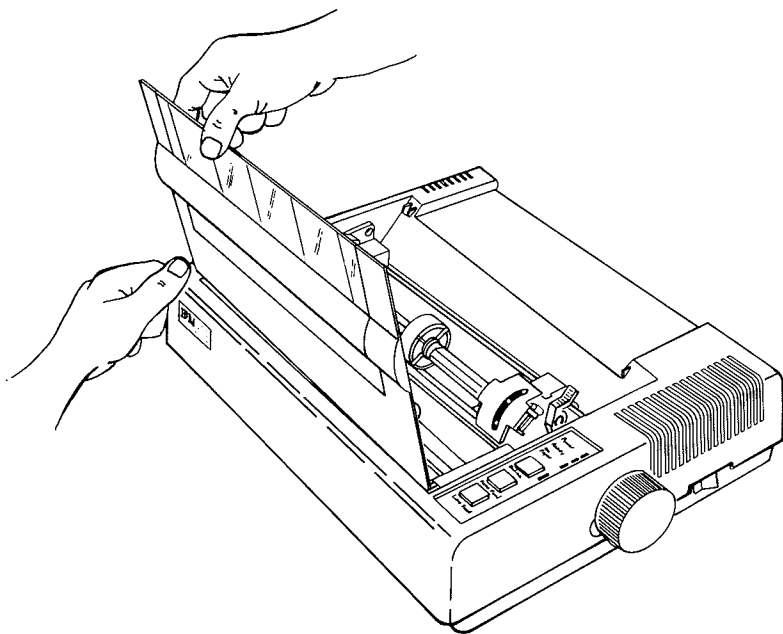
Control Panel Replacement

1. Insert control panel into top cover.
2. Install two screws. **A**
3. Replace top cover (5630).
4. Replace access cover (5630).
5. Replace forms rack (5640).

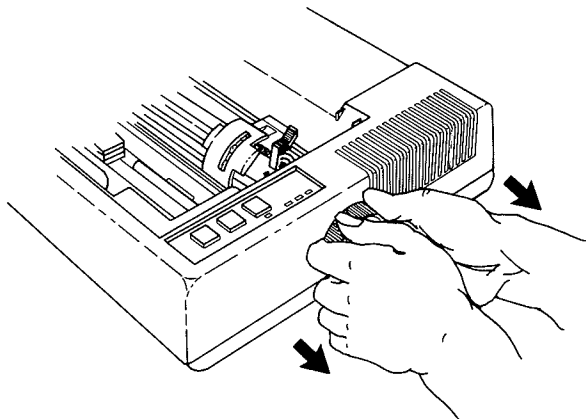
1. Raise access cover.



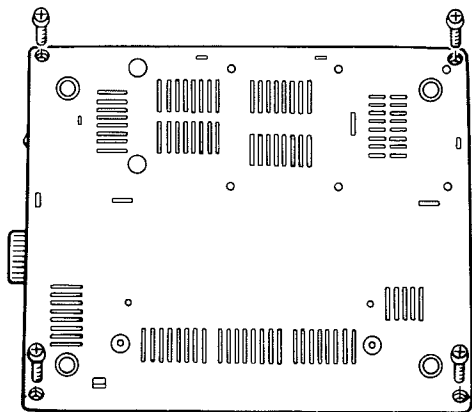
2. Lift cover from base as shown.



1. Set printer Power switch to OFF; unplug printer power cord from wall outlet.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Pull forms feed knob from shaft using a steady, firm pull.



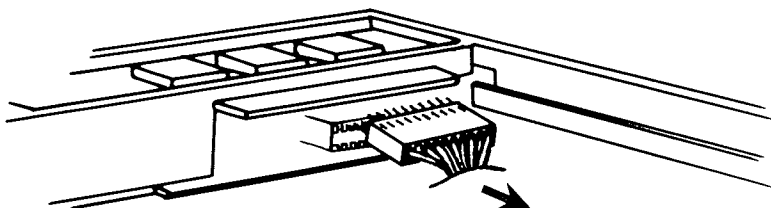
6. Turn printer upside down and place on smooth surface.
7. Loosen completely (using a Phillips screwdriver) the four corner screws in the base.



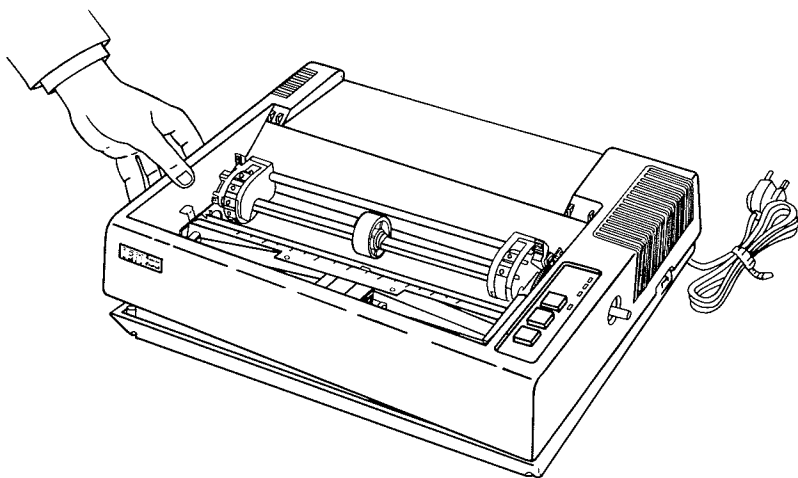
8. Turn printer rightside up.

CAUTION: Be sure to grasp both printer and base cover.

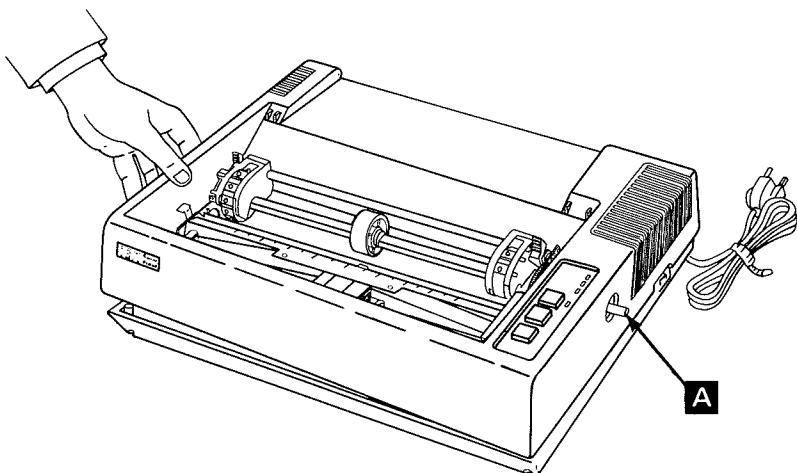
9. Pull control panel cable connector from control panel in top cover.



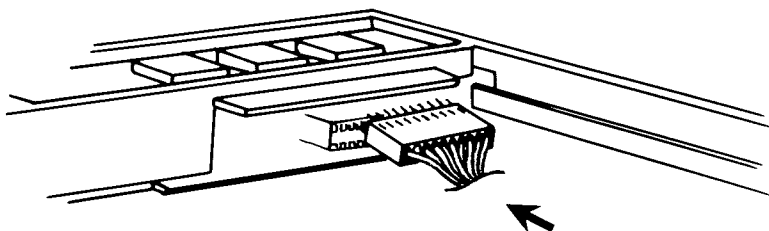
10. Lift top cover away from base cover. Lift left side first. Then, slide top cover to right to clear forms feed shaft.



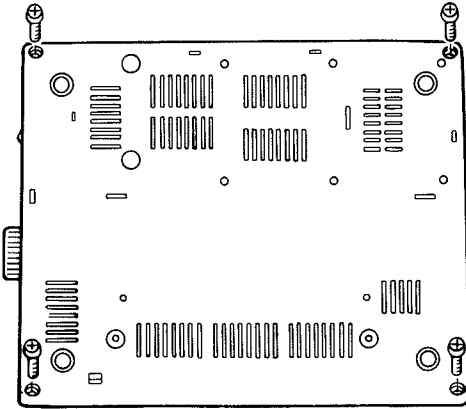
1. Position forms feed shaft through opening **A** in top cover and lower top cover onto base cover.



2. Connect control panel cable to control panel.

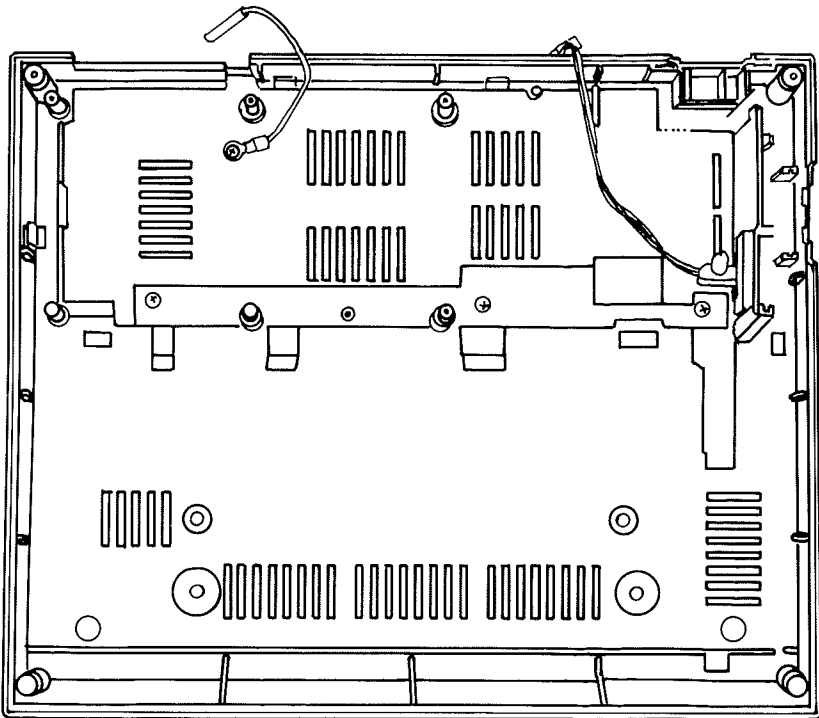


3. Turn printer upside down.
4. Install four screws.



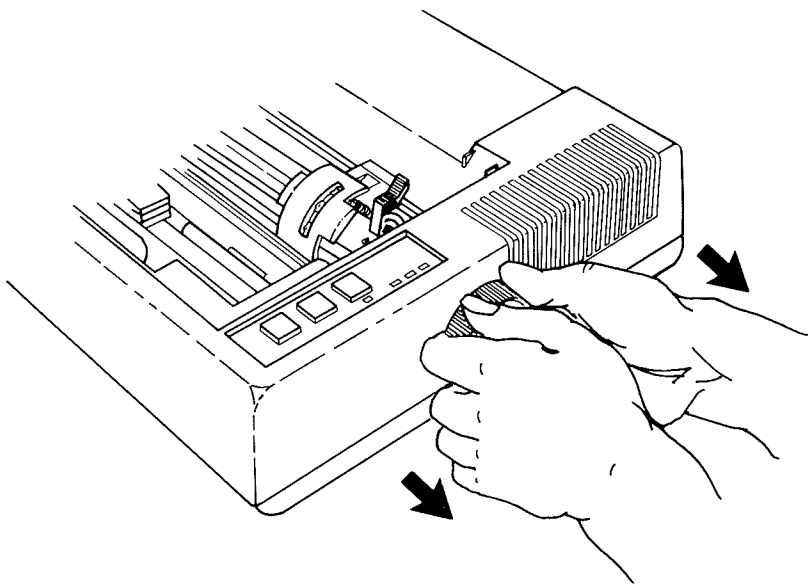
5. Turn printer rightside up.
6. Replace forms feed knob (5635).
7. Replace access cover (5630).
8. Replace forms rack (5640).

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Remove power transformer (5675).
7. Remove fuse-filter card/power cord (5655).
8. Remove driver circuit card (5620).
9. Remove control circuit card (5615).
10. Remove print mechanism assembly (5685).
11. Remove heat sink/power transistor assembly (5660).
12. Base cover is now completely detached from other FRUs.

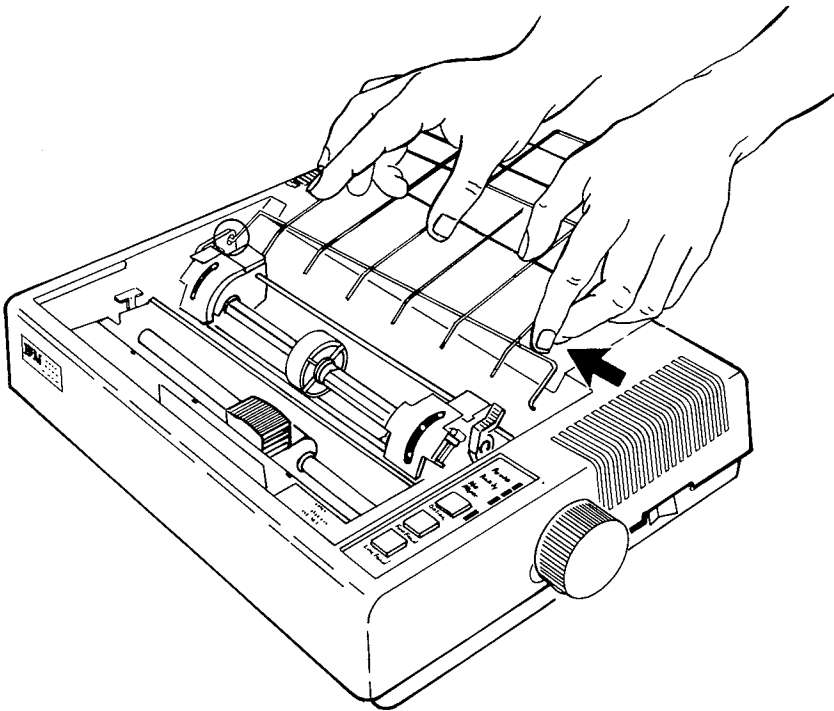


1. Set base cover on work surface.
2. Replace heat sink/power transistor assembly (5660).
3. Replace print mechanism assembly (5685).
4. Replace control circuit card (5615).
5. Replace driver circuit card (5620).
6. Replace fuse-filter card/power cord (5655).
7. Replace power transformer (5675).
8. Replace top cover (5630).
9. Replace access cover (5630).
10. Replace forms rack (5640).

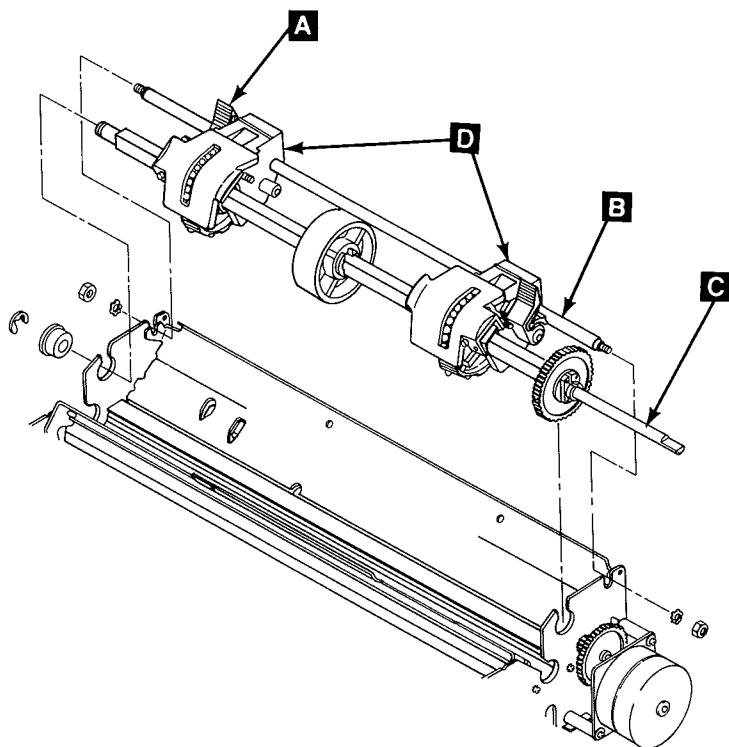
1. Pull forms feed knob from shaft using steady, firm pull.



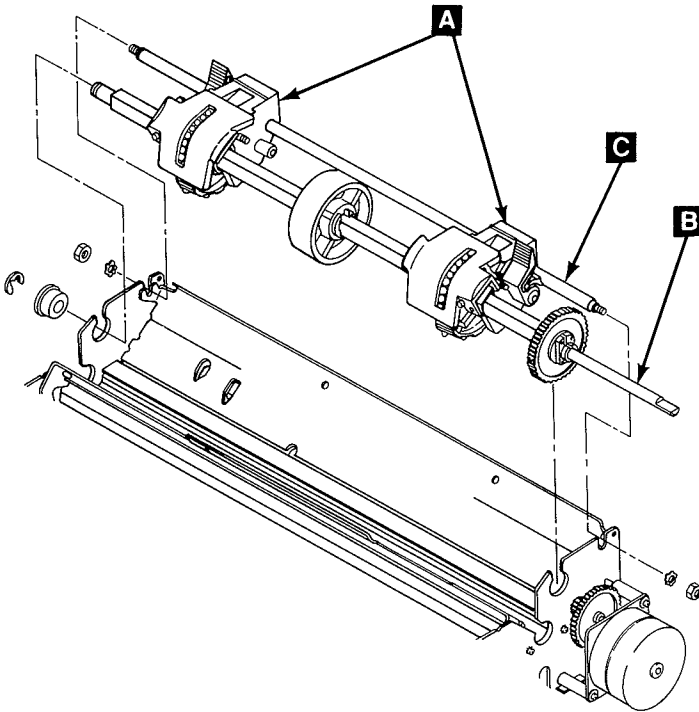
1. Remove forms.
2. Compress rack on one side to unhook rack from printer frame.
3. Lift rack away from frame.



1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Rotate lock levers **A** to forward (released) position.
7. Loosen nuts on ends of tractor support shaft **B**.
8. Remove retaining clip on left end of guide shaft **C** and slide bushings to outside of frame.
9. Lift guide shaft, support shaft and forms tractors from machine.
10. Slide forms tractors **D** off shafts.



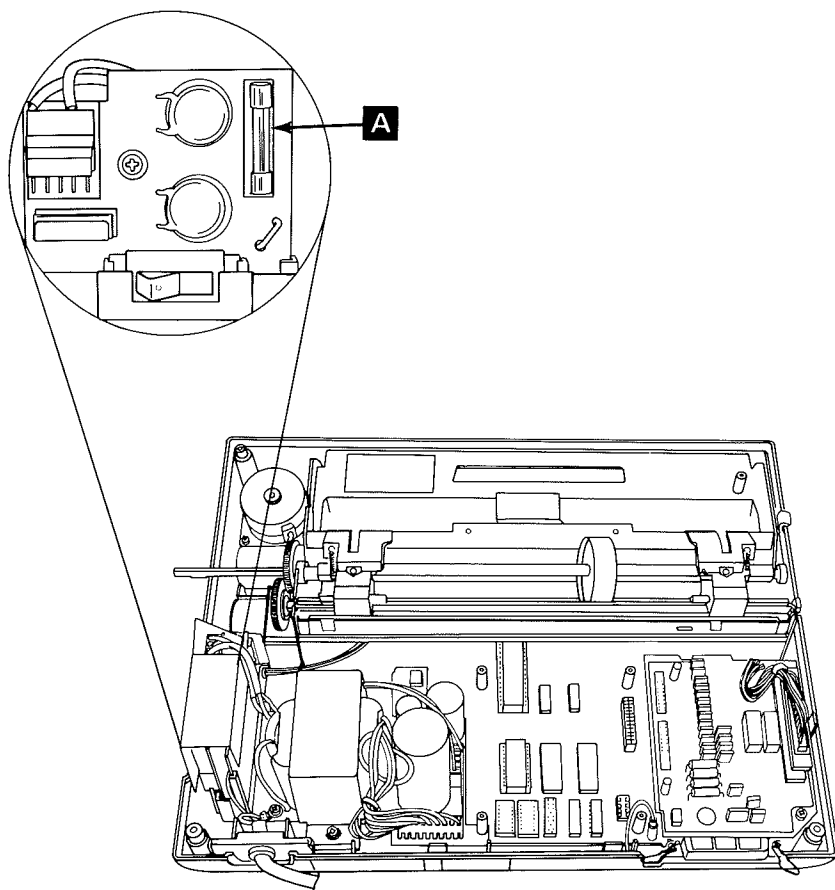
1. Slide forms tractors **A** onto guide shaft **B** and support shaft **C**.
2. Place guide shaft and support shaft into slots on frame.
3. Slide bushings on guide shaft into frame and replace retaining clip on left end of shaft.
4. Tighten retaining nuts on ends of support shaft.
5. Replace top cover (5630).
6. Replace access cover (5630).
7. Replace forms rack (5640).



1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).

DANGER: Static voltage may be present on the fuse-filter card. Use caution in this area.

6. Remove safety shield on fuse-filter card (5695).
7. Pull fuse **A** from holder.



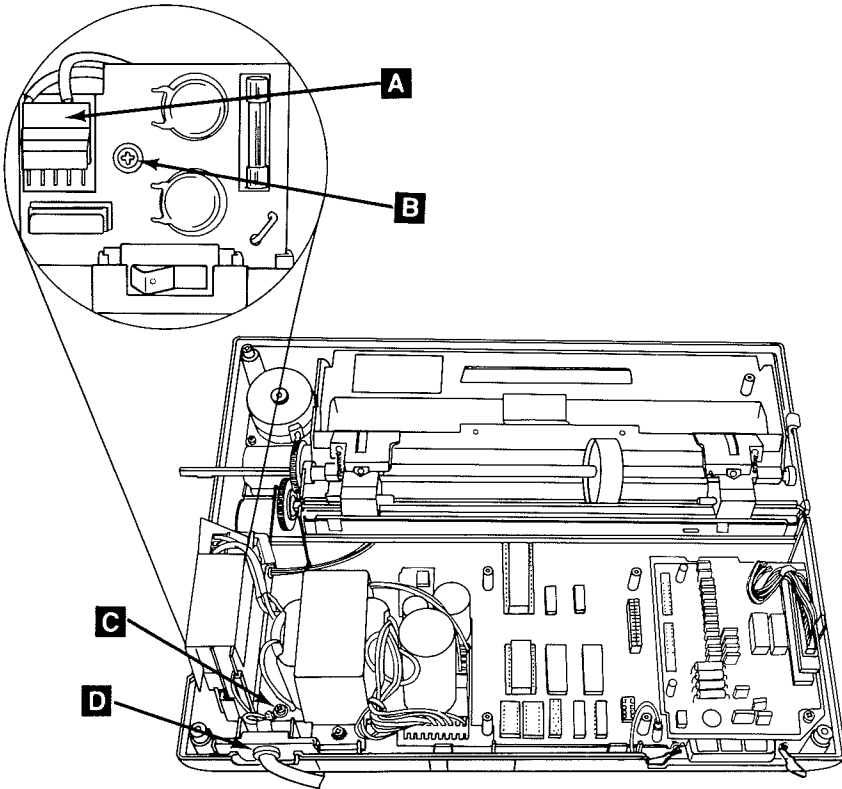
Fuse-Filter Card/Power Cord Removal

5655

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).

DANGER: Static voltage may be present on the fuse-filter card. Use caution in this area.

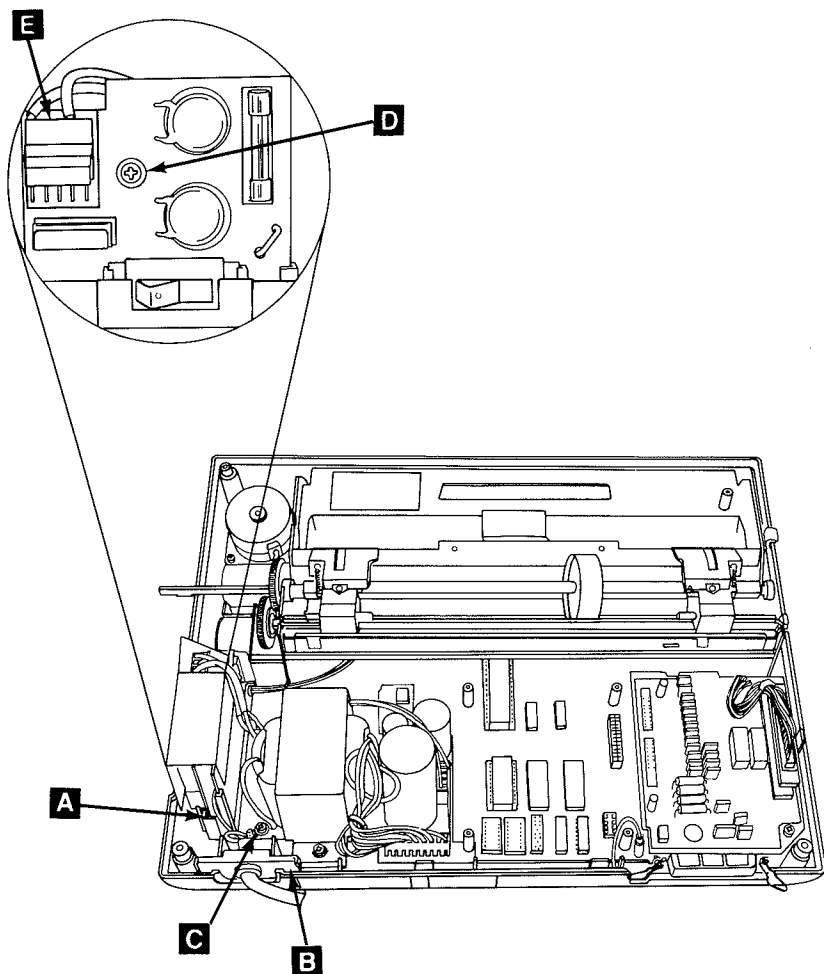
6. Remove safety shield from filter-fuse card assembly (5695).
7. Remove transformer primary connector **A** from fuse-filter card.
8. Remove screw **B** from center of fuse-filter card.
9. Remove screw **C** from ground terminal of printer power cord.
10. Lift strain relief **D** from slot in base cover.
11. Lift fuse-filter card from slot in base cover.



Fuse-Filter Card/Power Cord Replacement

5655

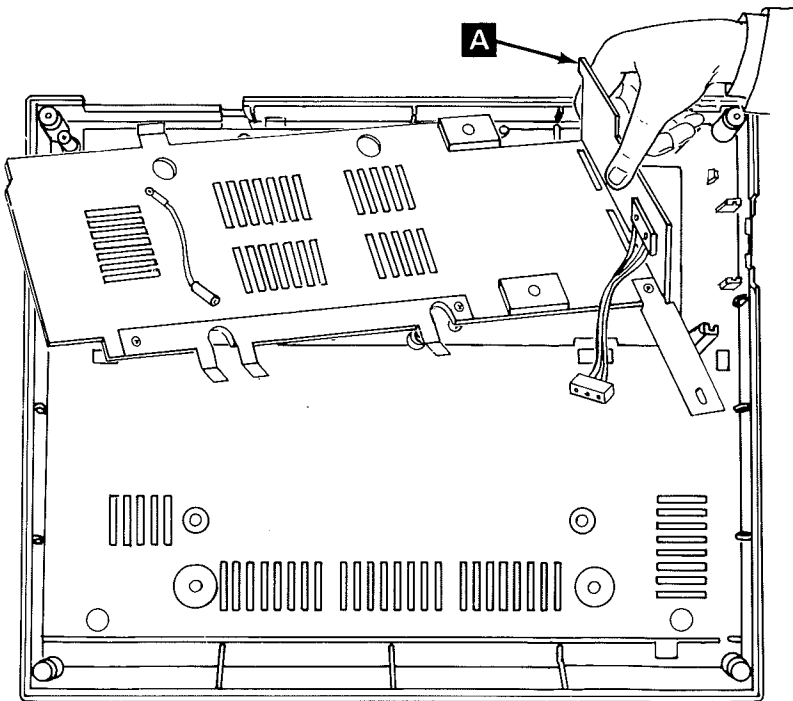
1. Insert fuse-filter card into slot **A** in base cover.
2. Insert strain relief into slot **B** in base cover.
3. Install screw **C** into ground terminal of power cord.
4. Install screw **D** in center of fuse-filter card.
5. Connect transformer primary **E** to fuse-filter card.
6. Replace safety shield onto fuse-filter card (5695).
7. Replace top cover (5630).
8. Replace access cover (5630).
9. Replace forms rack (5640).



Heat Sink/Power Transistor Assembly Removal

5660

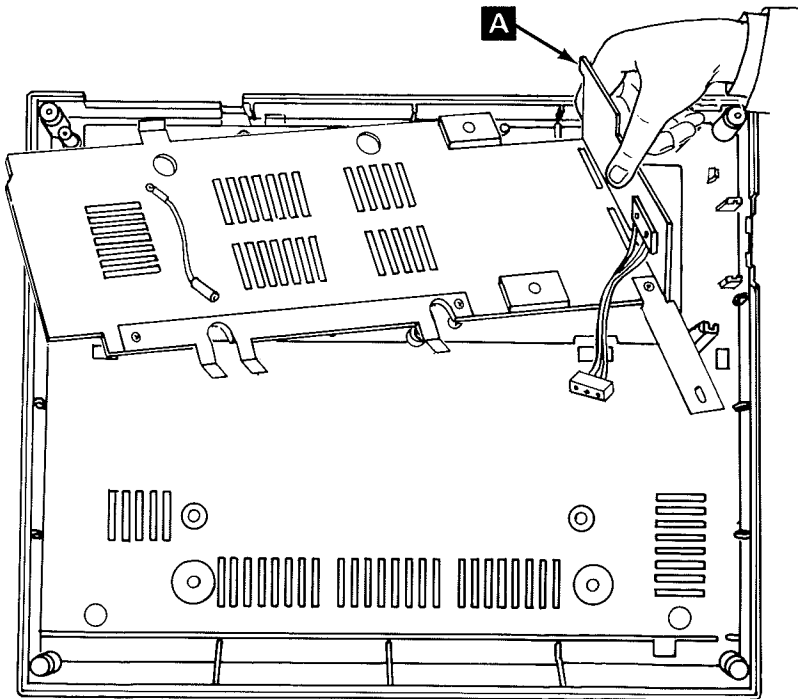
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Remove power transformer (5675).
7. Remove fuse-filter card/power cord (5655).
8. Remove driver circuit card (5620).
9. Remove control circuit card (5615).
10. Remove print mechanism assembly (5685).
11. Lift heat sink assembly **A** from base cover.



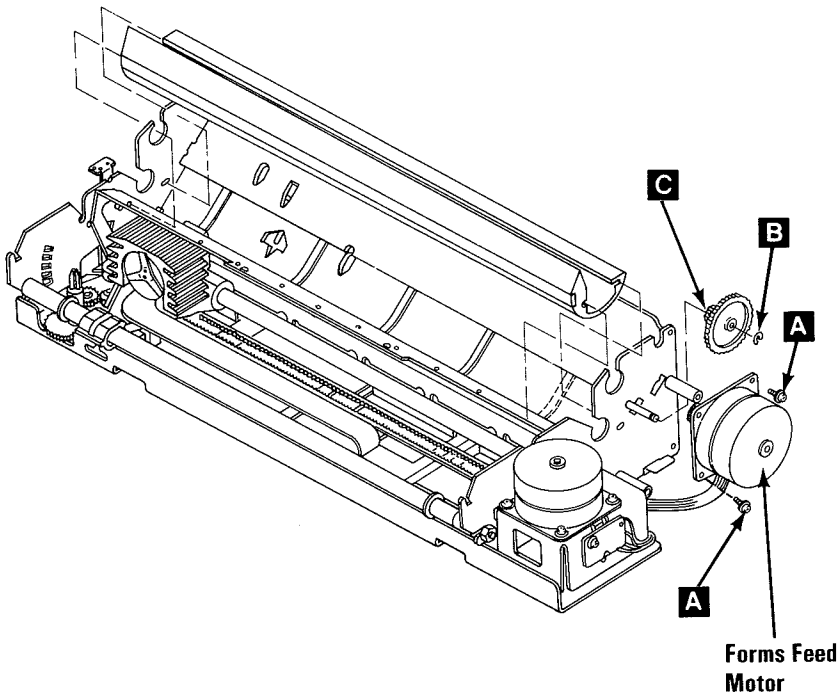
Heat Sink/Power Transistor Assembly Replacement

5660

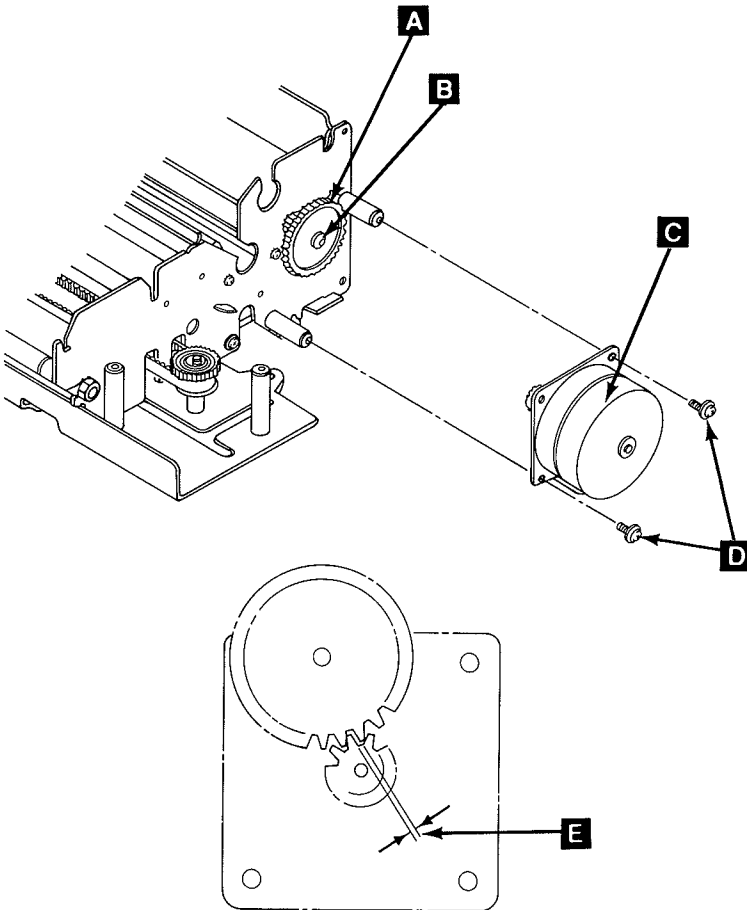
1. Position heat sink/power transistor assembly **A** onto base cover.
2. Replace print mechanism assembly (5685).
3. Replace control circuit card (5615).
4. Replace driver circuit card (5620).
5. Replace fuse-filter card/power cord (5655).
6. Replace power transformer (5675).
7. Replace top cover (5630).
8. Replace access cover (5630).
9. Replace forms rack (5640).



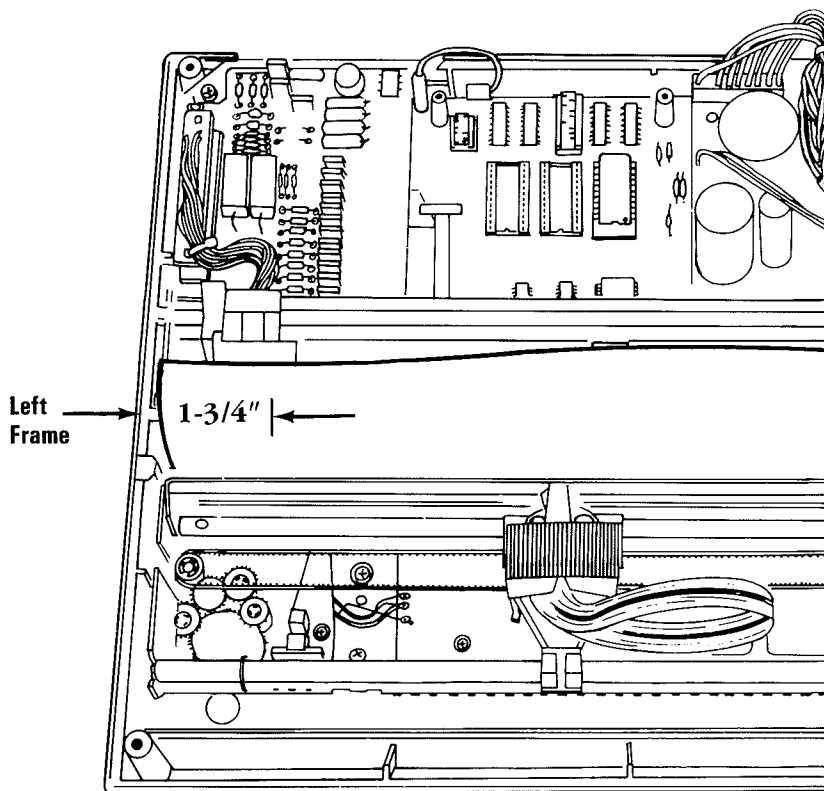
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Remove two screws **A** from forms feed motor mounts.
7. Remove intermediate gear retaining clip **B**.
8. Slide intermediate gear **C** off shaft.



1. Slide intermediate gear **A** onto shaft.
2. Replace retaining clip **B**.
3. Place forms feed motor **C** onto mounts.
4. Install two screws **D** but do not tighten.
5. Position motor to mesh gears with minimum backlash **E** and no binding.
6. Tighten two screws.
7. Replace top cover (5630).
8. Replace access cover (5630).
9. Replace forms rack (5640).



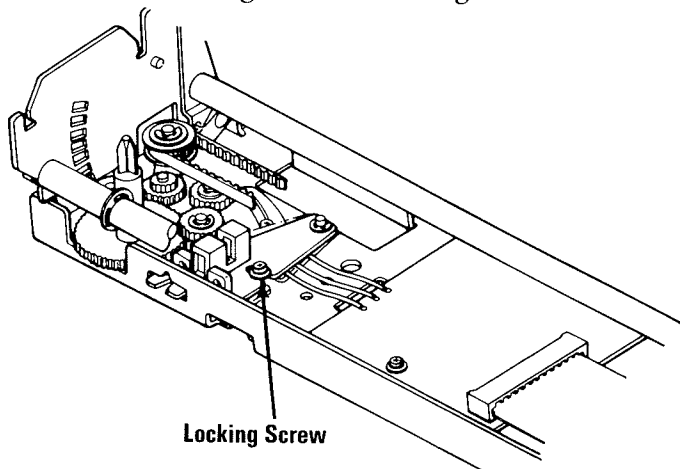
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).
6. Remove ribbon cartridge.
7. Insert a sheet of paper into the printer. Position paper to the left frame.
8. Measure 1-3/4" from the left frame and mark the position on the paper.



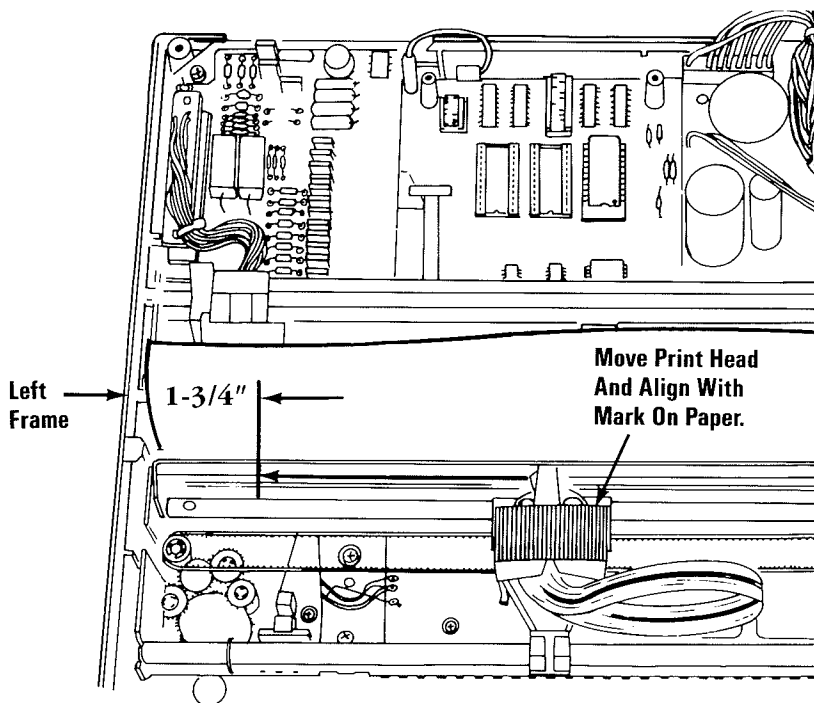
Left Margin Sensor Adjustment (cont.)

5670

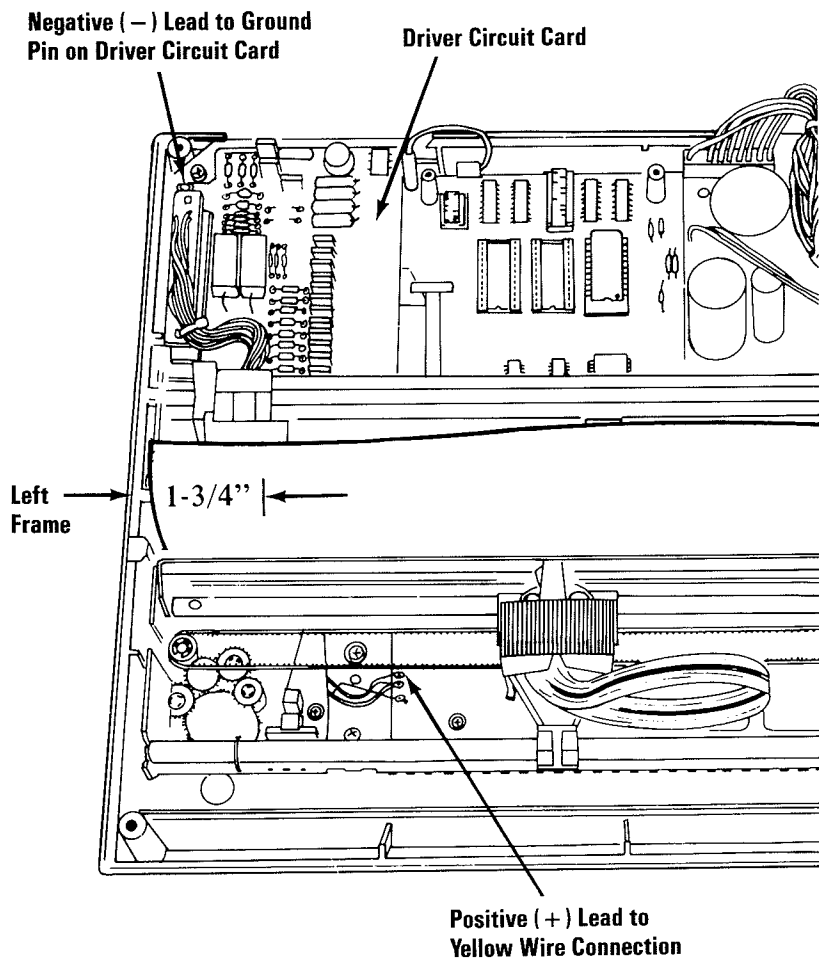
9. Loosen the left margin sensor locking screw.



10. Plug in the printer power cord. Position the printer Power switch to ON.
11. Move the print head manually and align it with the 1-3/4" mark on the paper.



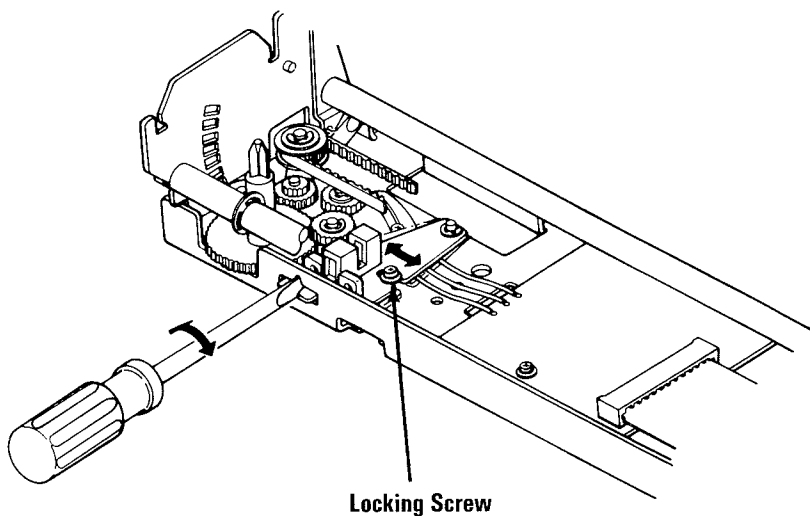
12. Set your multimeter to the 12 Vdc scale.
13. Place the negative (-) lead of the meter on the ground pin of the driver circuit card.
14. Place the positive (+) lead of the meter on the yellow wire solder connection on the left margin sensor.



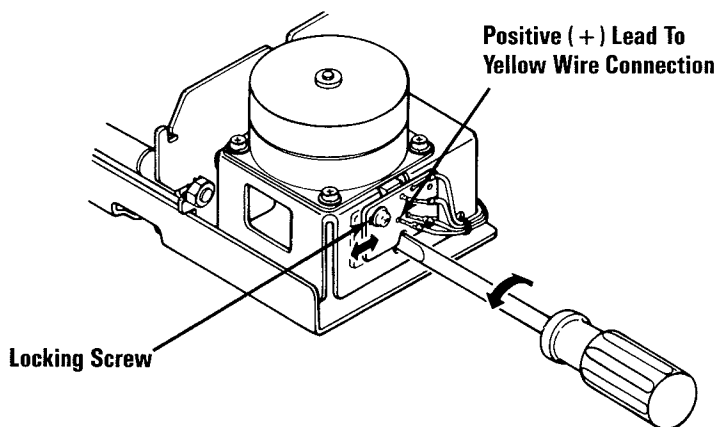
15. Move the left margin sensor to the left until the voltage reading on the meter is a down level (approximately 0 Vdc).
16. Move the left margin sensor to the right until the voltage on the meter is an up level (approximately 5 Vdc).

Note: If the voltage reading on the meter stays at a down level, move the print head one position to the left and repeat steps 15 and 16.

17. Tighten the left margin locking screw.



18. Place the positive (+) lead of the meter on the yellow wire solder connection on the printer timing sensor (PTS) board.
19. Loosen the printer timing sensor board locking screw.
20. Move the printer timing sensor board either way until the voltage reading is an up level (approximately 5 Vdc).

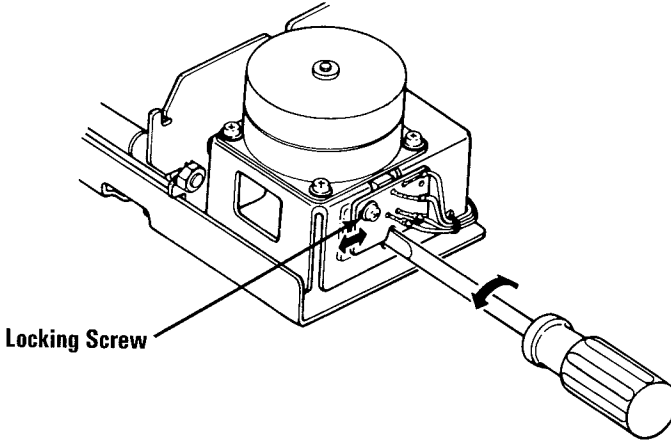


Adjustment of PTS Sensor Board

- 21a. Move the print head slightly to the left. The voltage reading should drop to a down level (approximately 0 Vdc). Do not allow the print head to step to the next detented position.
- b. Move the print head slightly to the right. The voltage reading should drop to a down level (approximately 0 Vdc).

Note: It is very important that the amount of pressure exerted on the print head be equal in either direction when the meter reading drops to the down level, without causing the print head to jump to the next detented position.

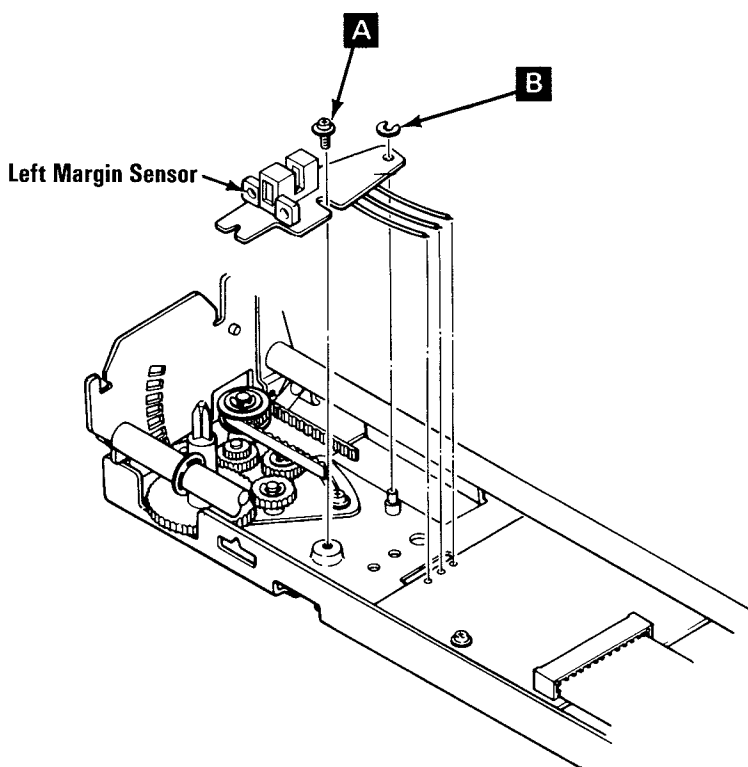
22. Tighten the printer timing sensor locking screw and recheck step 21. Realign if necessary.



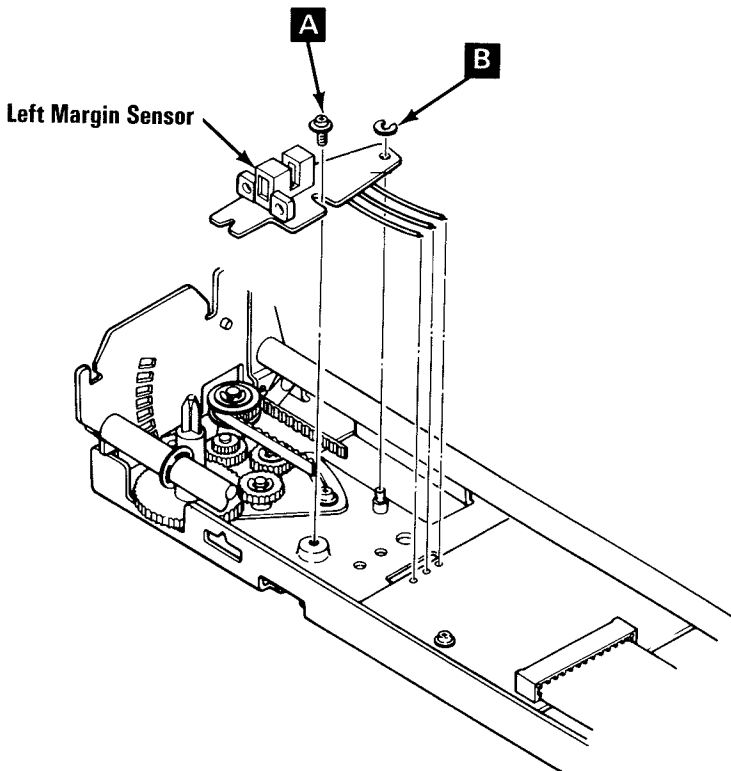
Adjustments of PTS Sensor Board

23. Run the "Printer Offline Diagnostic Test" and observe the speed in both directions.
24. If the buzzer sounds the printer timing sensor board is set incorrectly. Repeat the procedure starting at step 18.
25. If the speed is different between forward and reverse printing, perform the following steps.
 - a. Place the positive (+) lead of the voltage meter on the yellow wire solder connection on the printer timing sensor board.
 - b. Loosen the printer timing sensor board locking screw.
 - c. Move the printer timing sensor board until another up level location is observed and repeat the procedure from step 21.
26. If it is the same speed in both directions, the adjustment is complete.

1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove ribbon cartridge.
6. Remove top cover (5630).
7. Move carriage to right frame.
8. Remove retaining screw **A** and retaining clip **B**.
9. Unsolder three wires from left margin sensor.
10. Lift left margin sensor from printer.



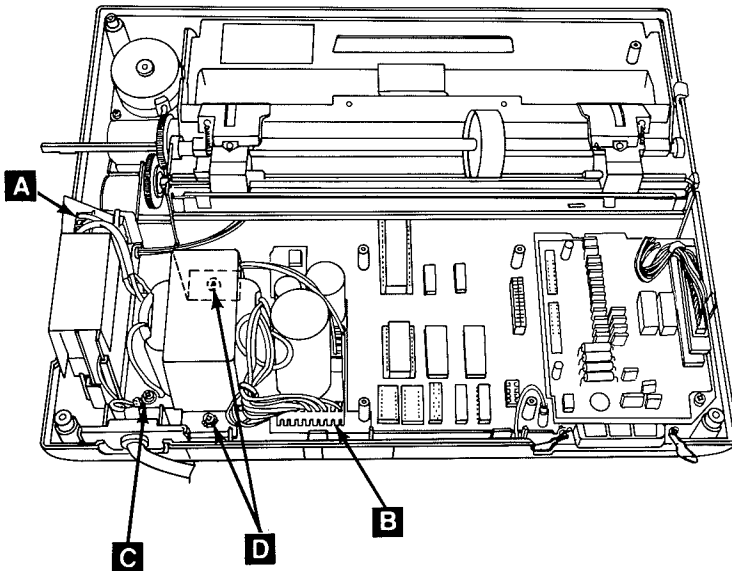
1. Solder three wires from terminal board to left margin sensor.
2. Position left margin sensor pivot hole over post.
3. Replace retaining screw **A** and retaining clip **B**.
4. Readjust left margin sensor (5670).
5. Replace top cover (5630).
6. Replace ribbon cartridge.
7. Replace access cover (5630).
8. Replace forms rack (5640).



1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).

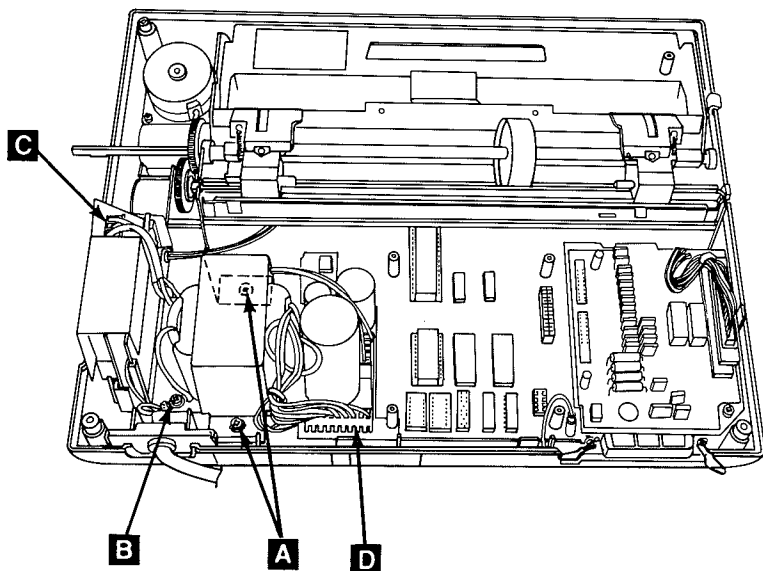
DANGER: Static Voltage May Be Present On The Fuse-Filter Card. Use Caution In This Area.

6. Unplug connector **A** from fuse-filter card.
7. Unplug connector **B** from control circuit card.
8. Remove screw **C** from transformer ground wire.
9. Remove two screws **D** from base of transformer.
10. Lift transformer from base.



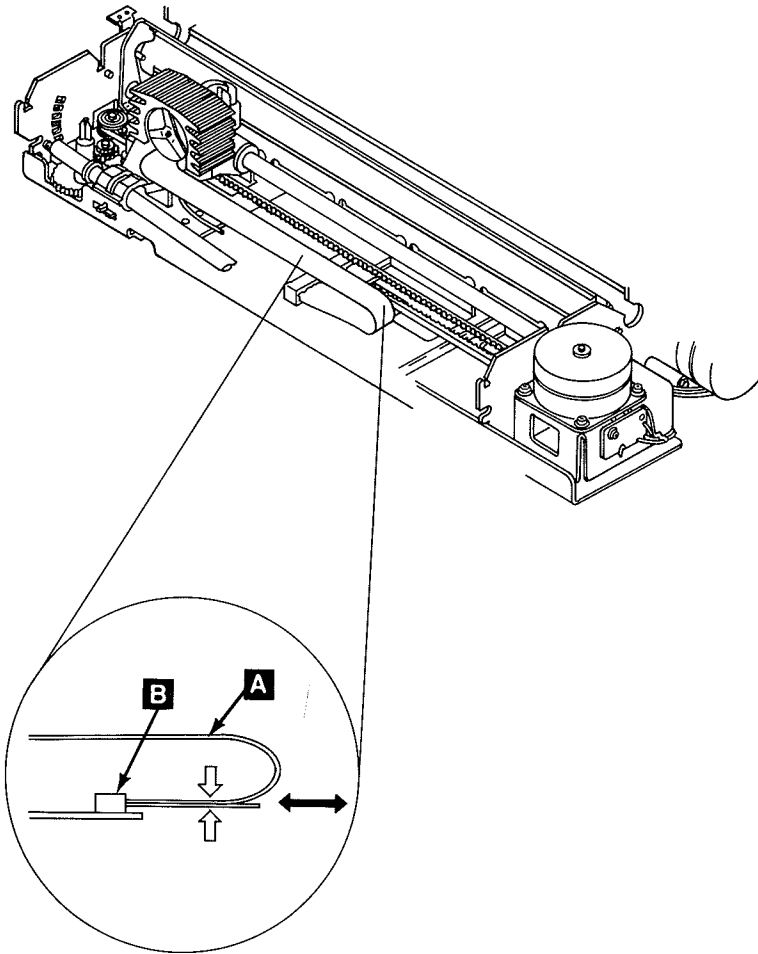
Power Transformer Replacement 5675

1. Place transformer on base in area next to fuse-filter card (note positioning of two connectors).
2. Install two base mounting screws **A**.
3. Install screw in ground wire **B**.
4. Plug connector **C** into fuse-filter card.
5. Plug connector **D** into control circuit card.

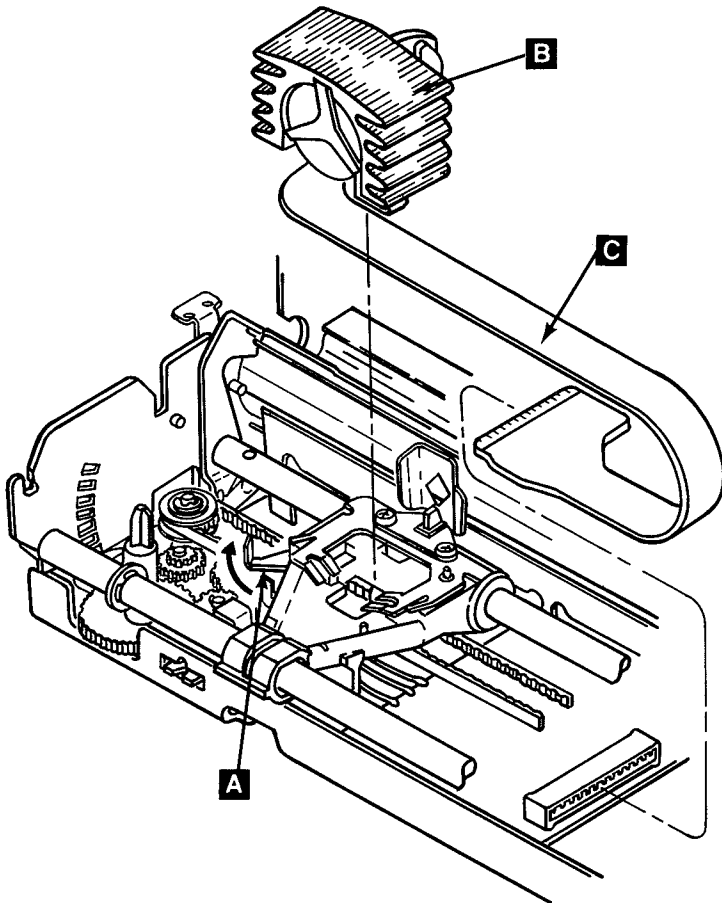


6. Replace top cover (5630).
7. Replace access cover (5630).
8. Replace forms rack (5640).

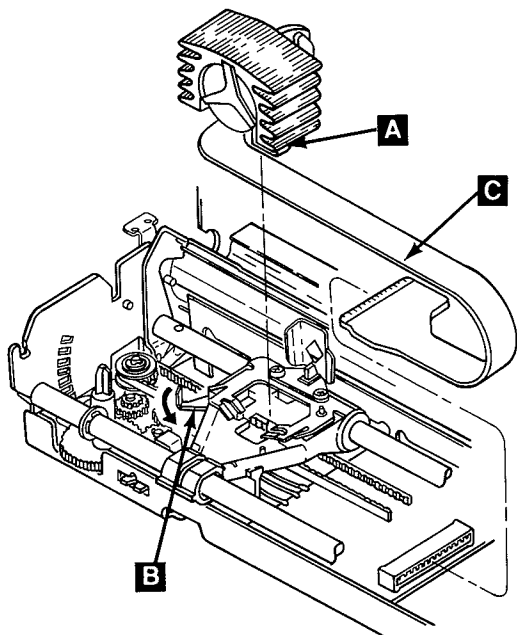
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms rack (5640).
3. Remove access cover (5630).
4. Remove ribbon cartridge.
5. Remove top cover (5630).
6. Pull print head cable **A** from connector **B** .



7. Pivot print head lock lever **A** clockwise.
8. Lift print head **B** and cable **C** from carriage.



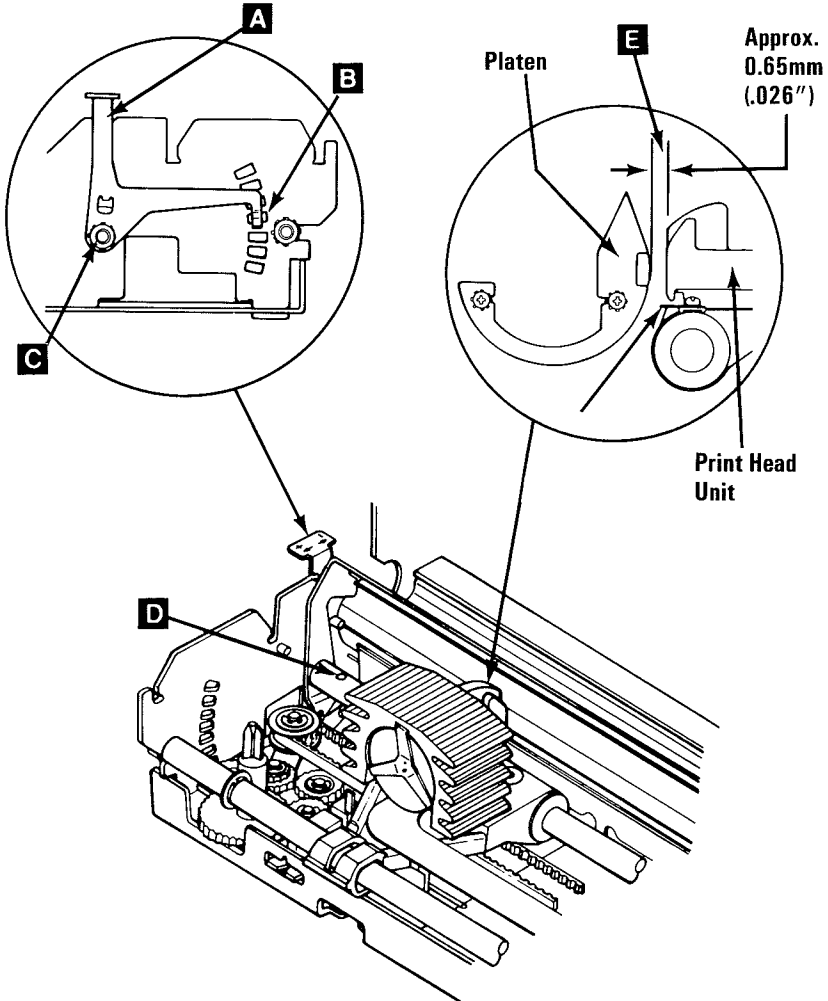
1. Insert feet **A** on print head into opening on carriage.
2. Pivot lock lever **B** counterclockwise while pressing down on print head.
3. Connect print head cable **C** at connector.
4. Replace top cover (5630).
5. Replace ribbon cartridge.
6. Replace access cover (5630).
7. Replace forms rack (5640).



Note: Broken wires may be the result of other problems. If a print head has been replaced because of a broken wire, perform the following steps to prevent damaging the newly installed print head.

1. Remove the top cover. Disconnect CN6 on the driver control card. Check for 22 ohms resistance between pin CN6-10 (male end) and pins CN6-1 through 9. Replace the print mechanism assembly if there are any shorts or opens.
2. Power on. Check for + 24 Vdc at pins CN6-1 through 9 on driver card (use ground pin for common lead). If any pin has + 24 Vdc, replace the control cards. If all pins read 0 Vdc, power off and reconnect CN6. Print head circuitry is functional.

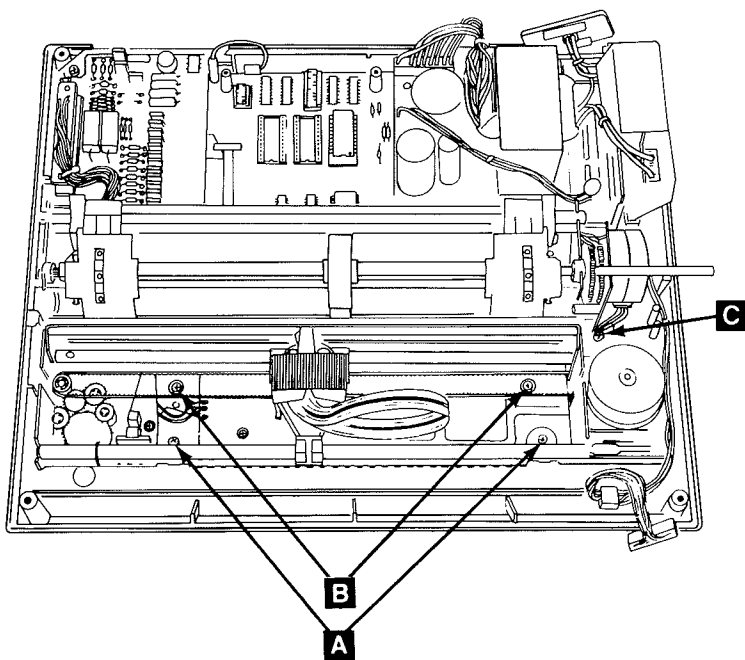
1. Remove print mechanism assembly (5685).
2. Set print head gap adjusting lever **A** to the fourth position **B**.
3. Loosen nut **C**.
4. Rotate carriage shaft **D** to obtain .65mm gap (.026") between print head and platen **E**.
5. Tighten nut **C**.
6. Replace print mechanism assembly (5685).



Print Mechanism Assembly Removal

5685

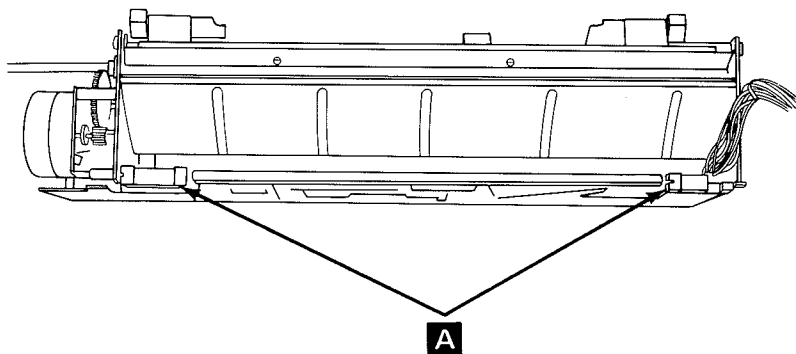
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove ribbon cartridge.
6. Remove top cover (5630).
7. Remove driver circuit card (5620).
8. Remove control circuit card (5615).
9. Remove two screws **A** from base of Print Mechanism assembly.
10. Remove shipping screws **B** if still installed.
11. Remove screw **C** from ground strap.
12. Lift print mechanism assembly from base cover.



Print Mechanism Assembly Replacement

5685

1. Verify that the rubber grommets **A** are in position shown.

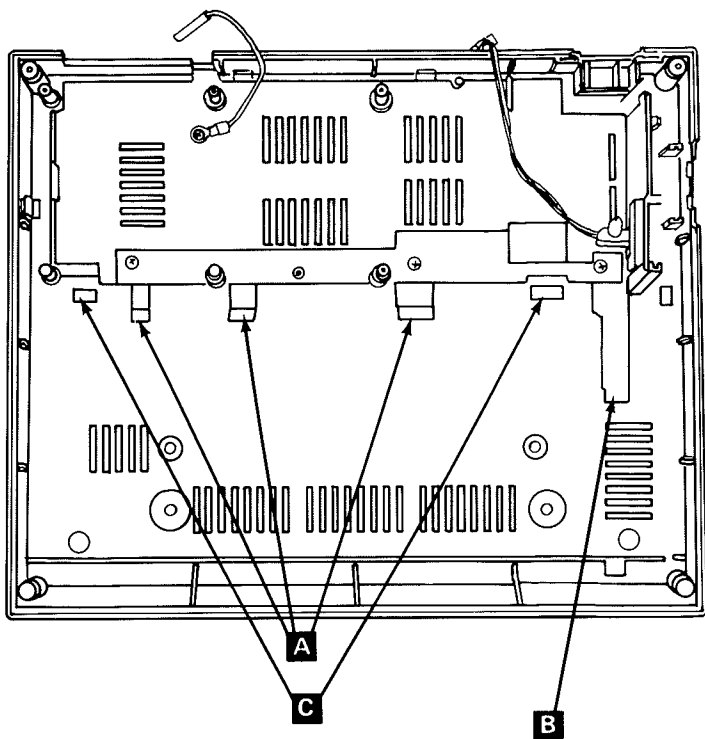


(Rear View)

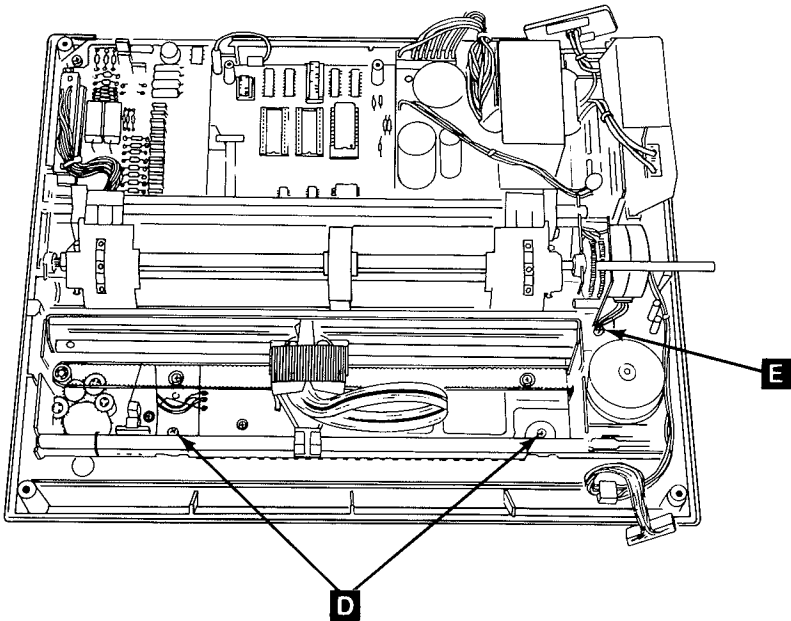
Print Mechanism Assembly Replacement (cont.)

5685

2. Place print mechanism assembly on base cover.
3. Slide print mechanism assembly toward the rear over three grounding tabs **A** and under ground strap **B**.
4. Position rubber grommets around plastic stops **C**.

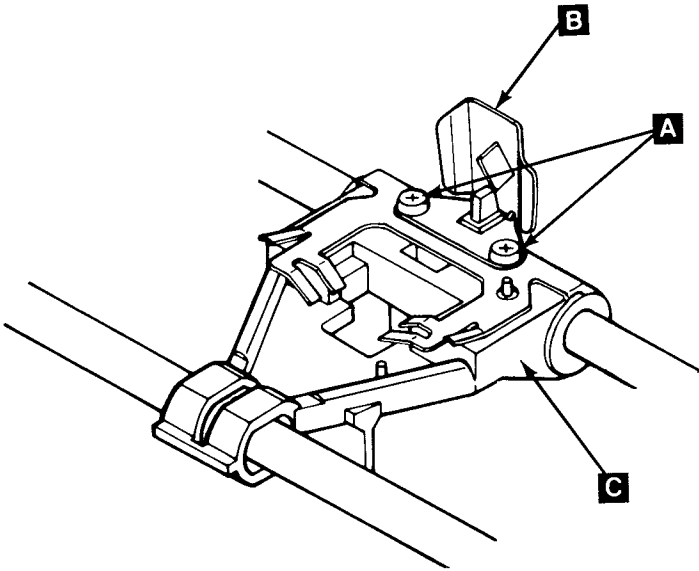


5. Install two screws **D** .

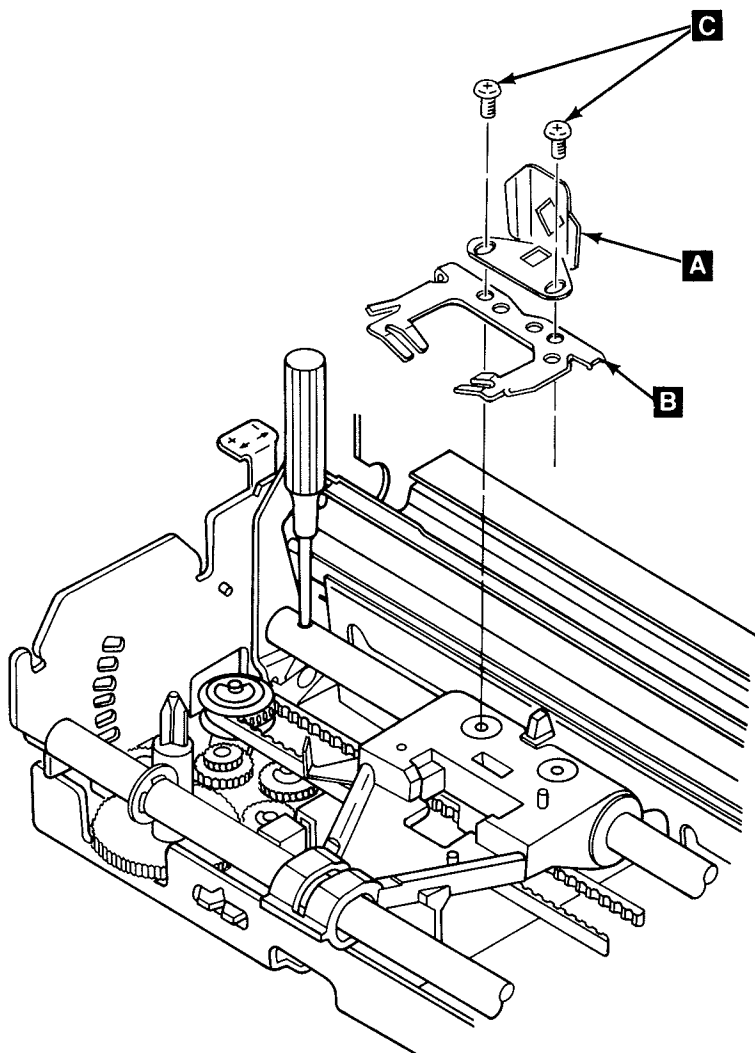


6. Install screw **E** in ground strap.
7. Replace control circuit card (5615).
8. Replace driver circuit card (5620).
9. Replace top cover (5630).
10. Replace ribbon cartridge.
11. Replace access cover (5630).
12. Replace forms rack (5640).

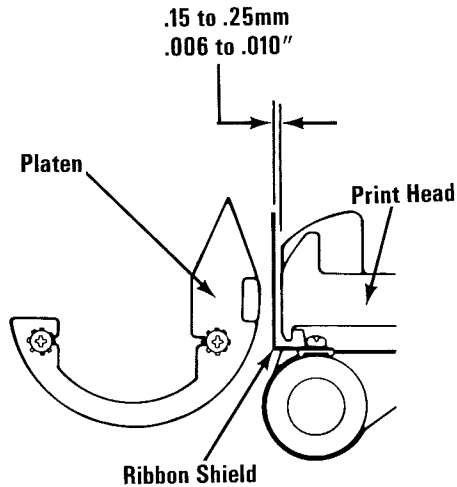
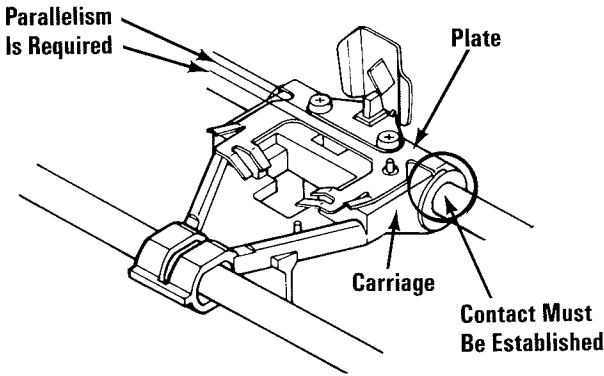
1. Set printer Power switch to OFF; unplug printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove ribbon cartridge.
5. Remove access cover (5630).
6. Remove top cover (5630).
7. Remove print head (5680).
8. Remove two screws **A** at base of ribbon shield **B**.
9. Lift shield straight up from carriage **C**.



1. Position shield **A** and plate **B** on print head carriage.
2. Insert screws **C** . (Do not tighten.)



3. Position shield and plate as shown. Tighten screws.



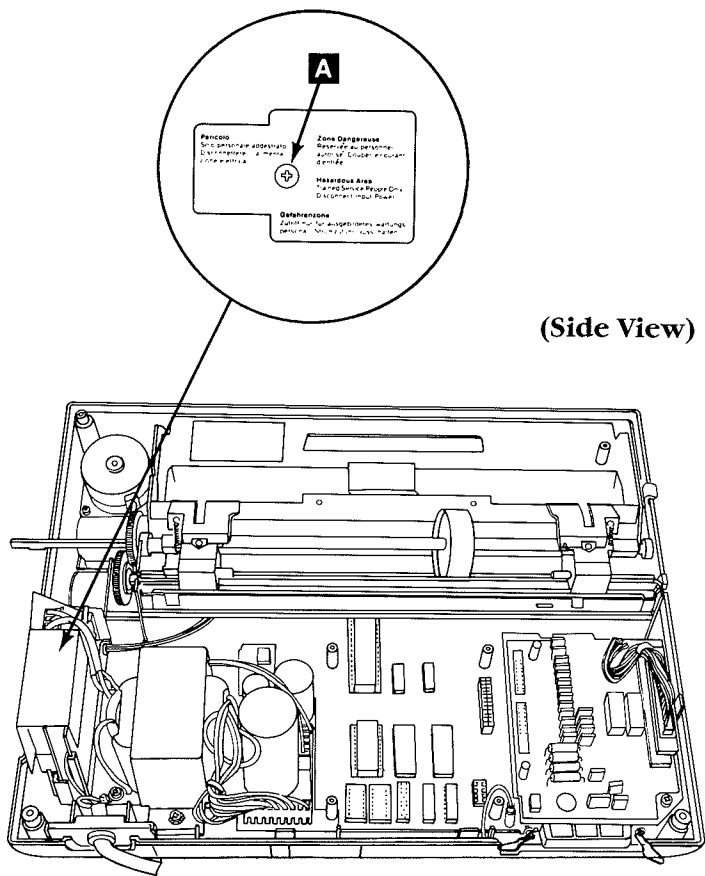
(Left View)

4. Replace print head (5680).
5. Replace top cover (5630).
6. Replace ribbon cartridge.
7. Replace access cover (5630).
8. Replace forms rack (5640).

1. Set printer Power switch to OFF; unplug Printer power cord from wall outlet and disconnect printer cable.
2. Remove forms.
3. Remove forms rack (5640).
4. Remove access cover (5630).
5. Remove top cover (5630).

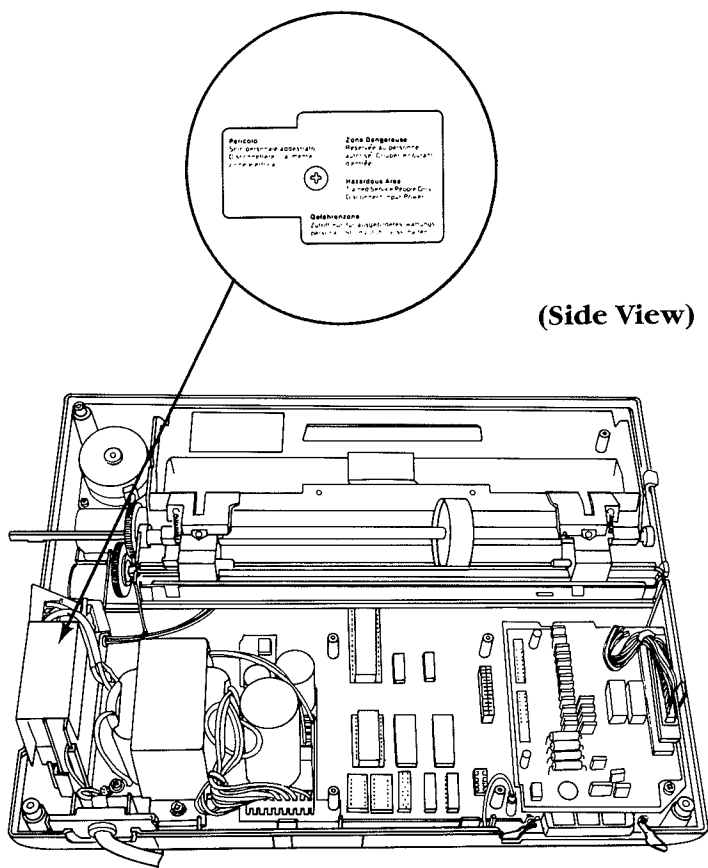
DANGER: Static voltage may be present on the fuse-filter card. Use caution in this area.

6. Loosen screw **A**.
7. Lift safety shield from fuse-filter card.



DANGER: Static voltage may be present on the fuse-filter card.
Use caution in this area.

1. Position safety shield on fuse-filter card.
2. Install screw .



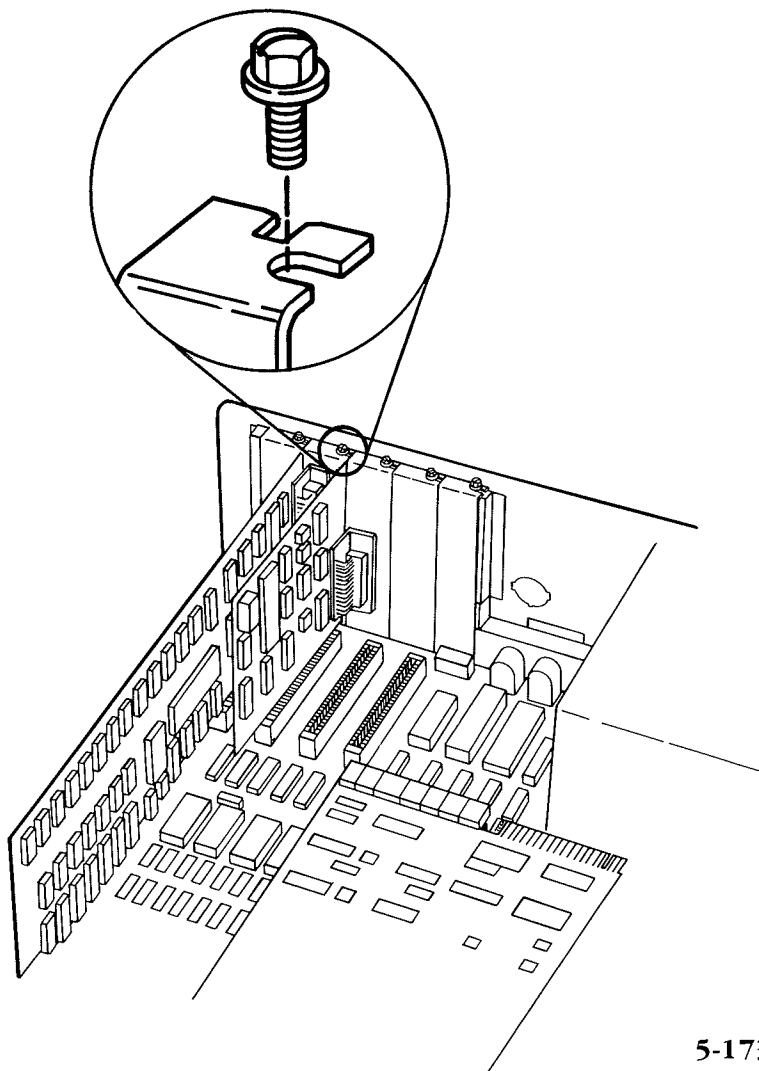
3. Replace top cover (5630).
4. Replace access cover (5630).
5. Replace forms rack (5640).

Option Adapters

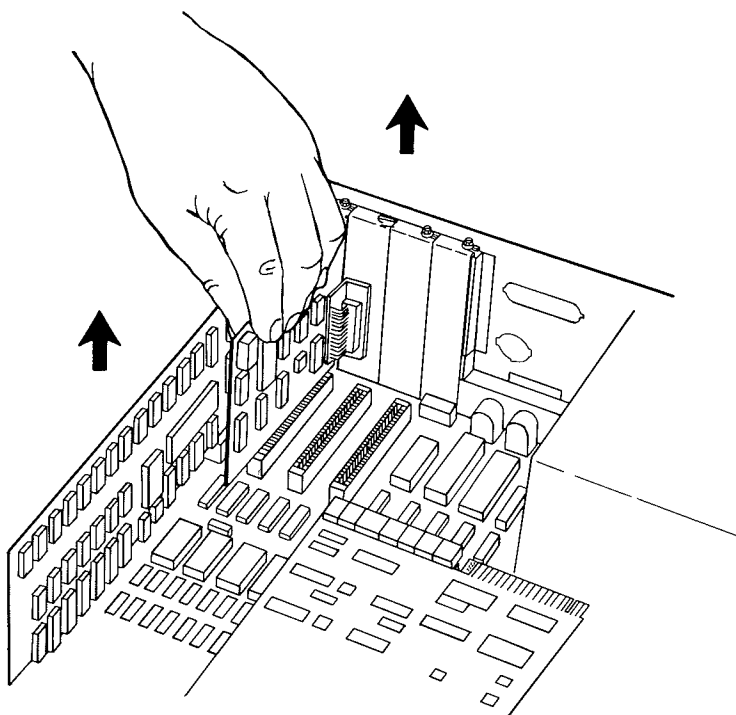
Option Adapters Removal

5800

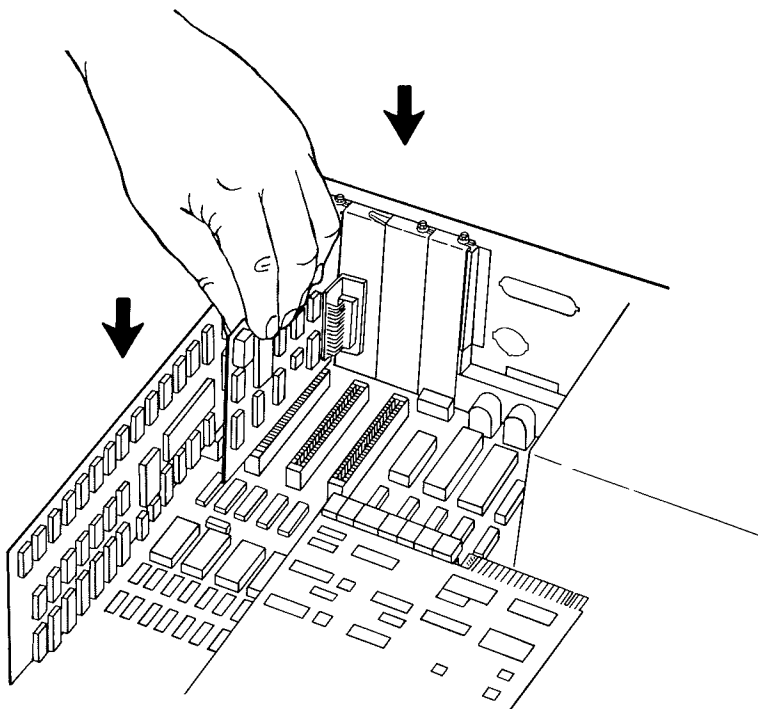
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet and disconnect all cables from rear of the unit(s).
3. Remove the unit cover (5900).
4. Remove the option adapter mounting screw.



5. Grasp the option adapter by the top corners and lift straight up.

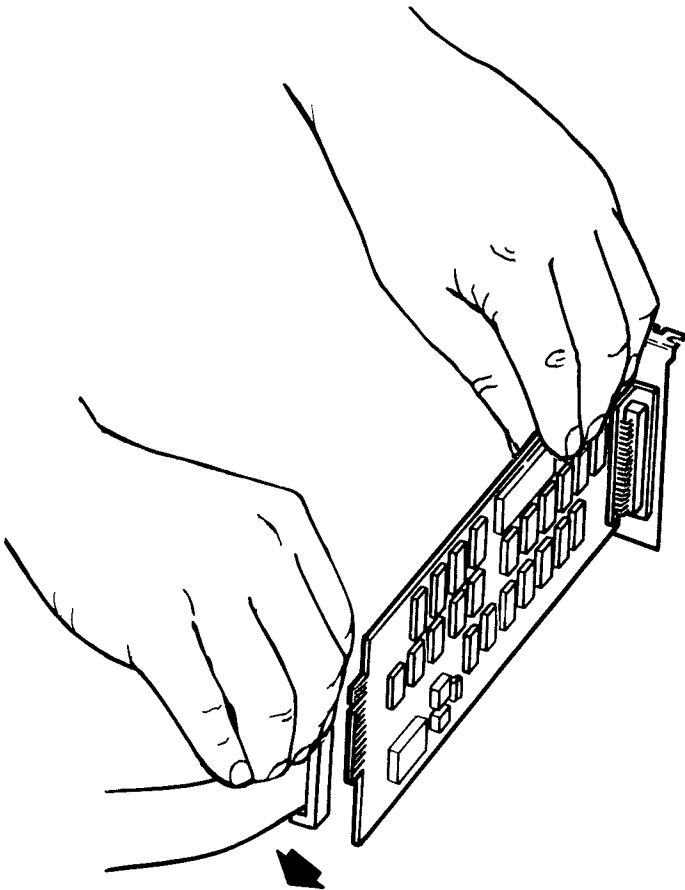


1. Insert the option adapter into an option expansion slot. Press down firmly on the option adapter to seat the connector.



2. Install the option adapter mounting screw.
3. Replace the unit cover (5900).

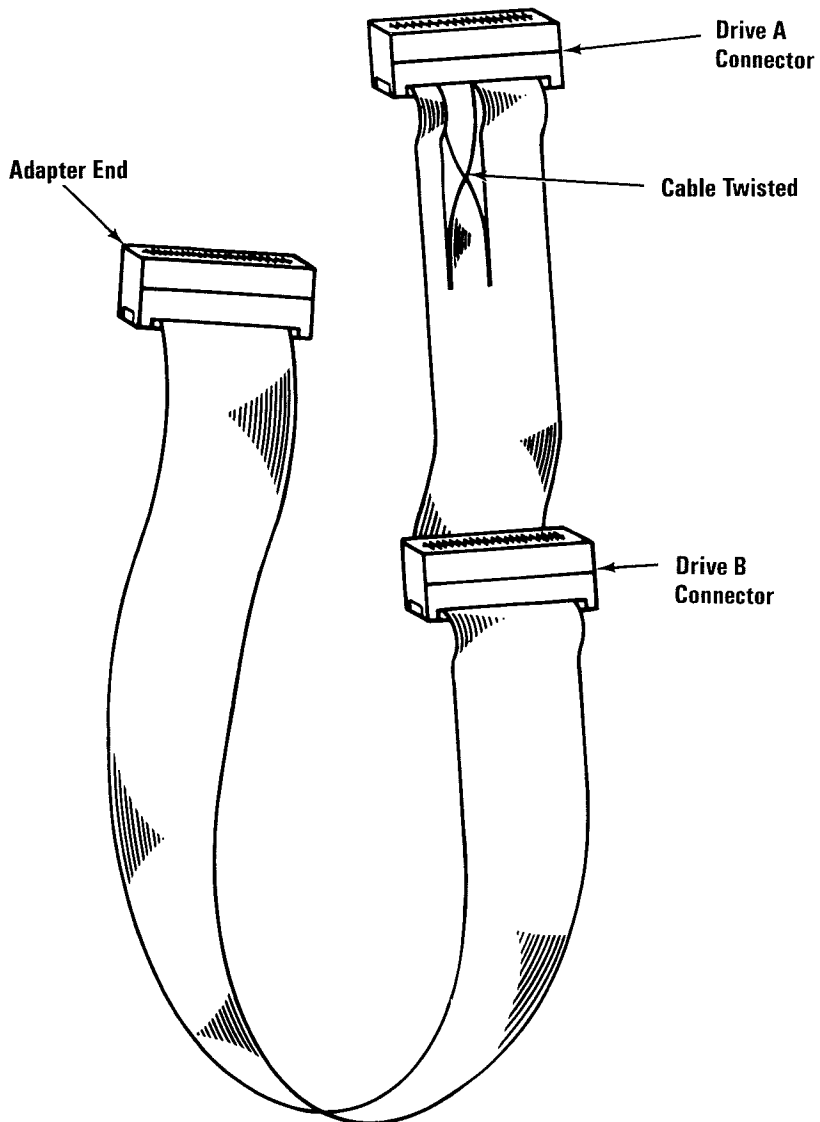
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Unplug system unit's (and expansion unit's) power cord(s) from the wall outlet and disconnect all cables from rear of the unit(s).
3. Remove unit cover (**5900**).
4. Remove the diskette adapter mounting screw.
5. Grasp the diskette adapter by the top corners and lift straight up.
6. Disconnect the signal cable from the diskette adapter.



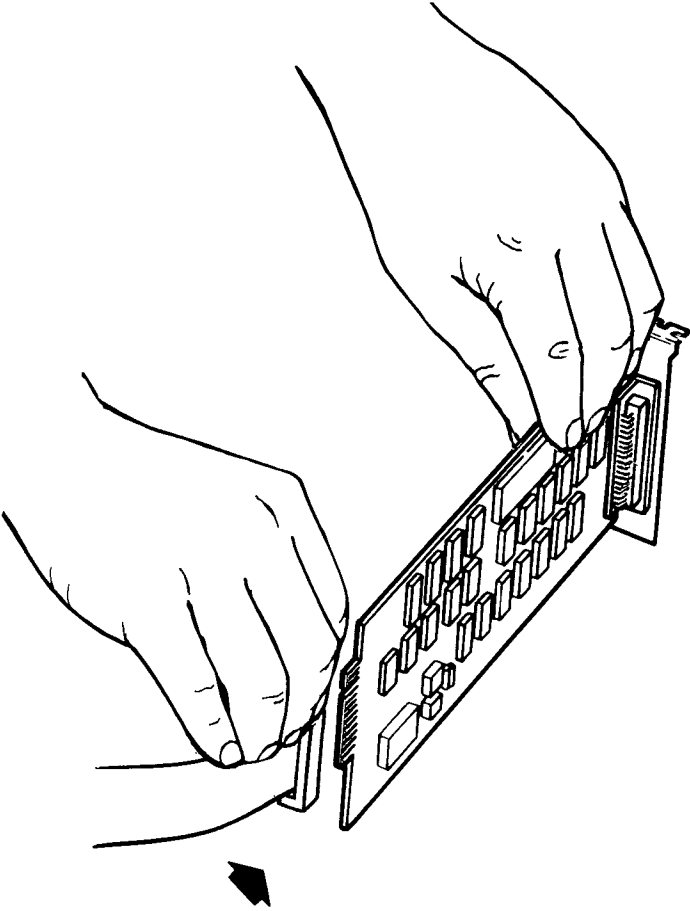
Diskette Drive Adapter Replacement

5810

1. Familiarize yourself with the signal cable before installing the connector.



2. Connect the adapter end of the signal cable to the diskette adapter.

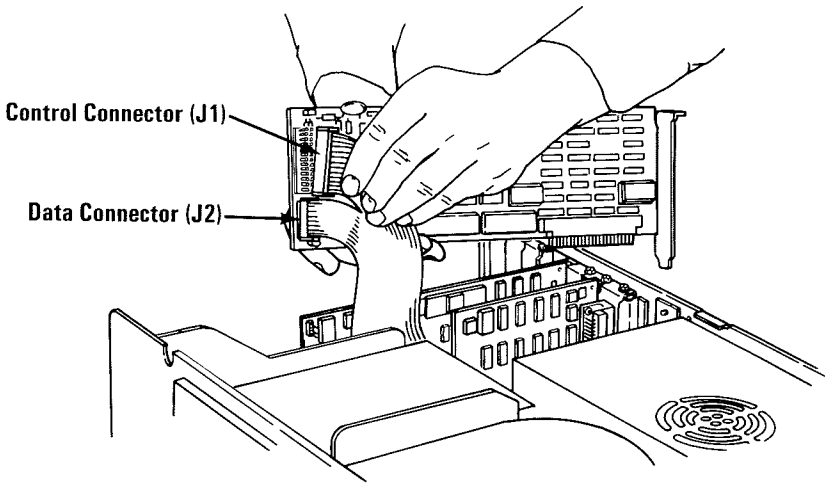


3. Insert the diskette adapter into the option expansion slot. Press down firmly on the diskette adapter to seat the connector.
4. Install the diskette adapter mounting screw.
5. Replace the unit cover (5900).

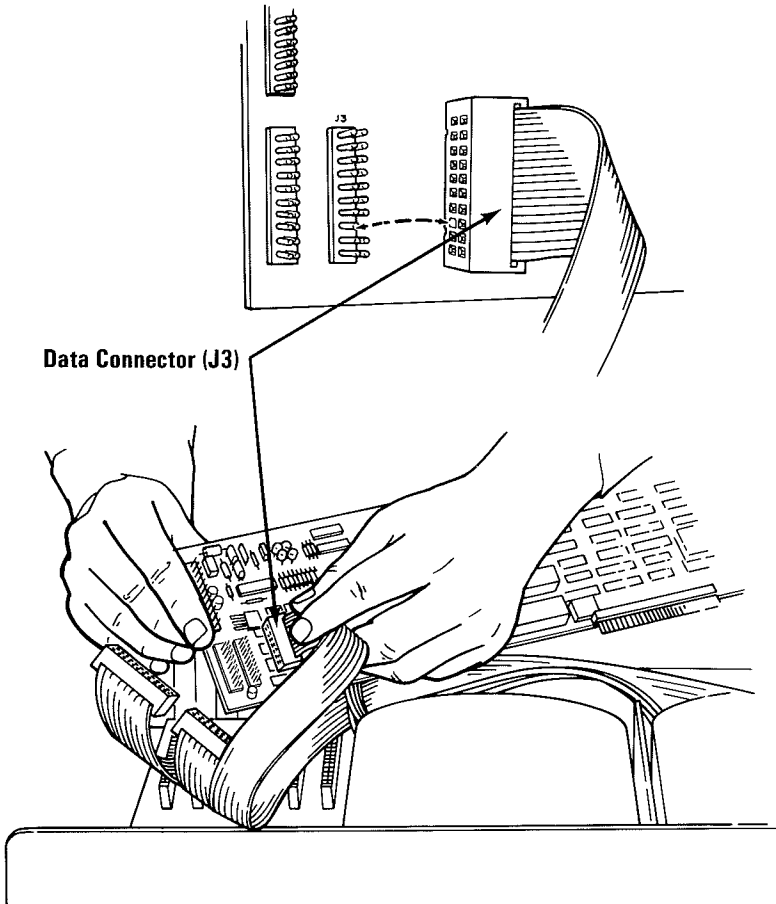
Fixed Disk Drive Adapter Removal

5820

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet and disconnect all cables from the rear of the unit(s).
3. Remove the expansion unit cover (**5900**).
4. Remove the disk adapter mounting screw (**5800**).
5. Grasp the disk adapter by the top corners and lift straight up.
6. Remove the J2 data connector and the J1 control connector.



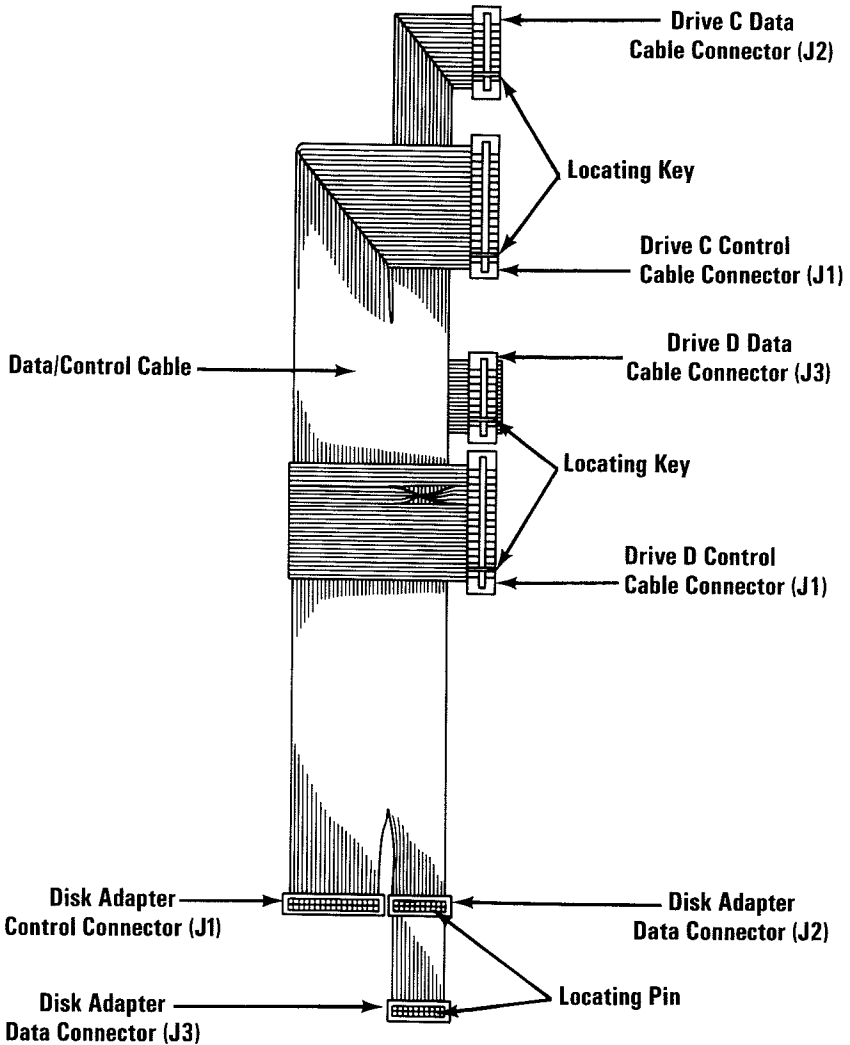
7. If two fixed disk drives are installed, remove the J3 data connector.



Fixed Disk Drive Adapter Replacement

5820

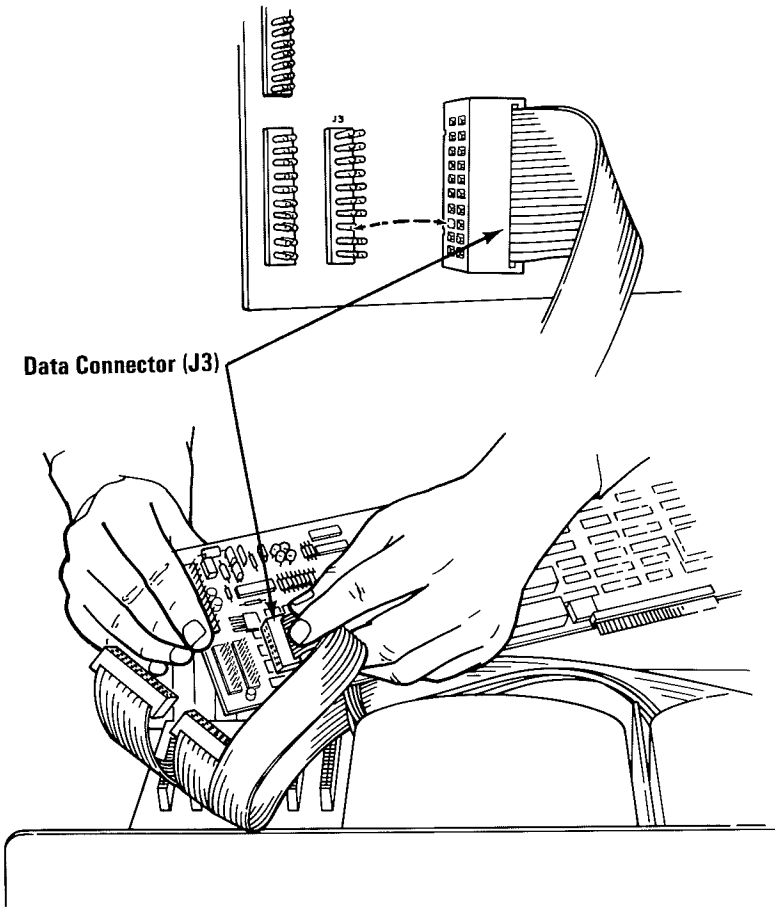
1. Familiarize yourself with the data/control cable before starting the installation.



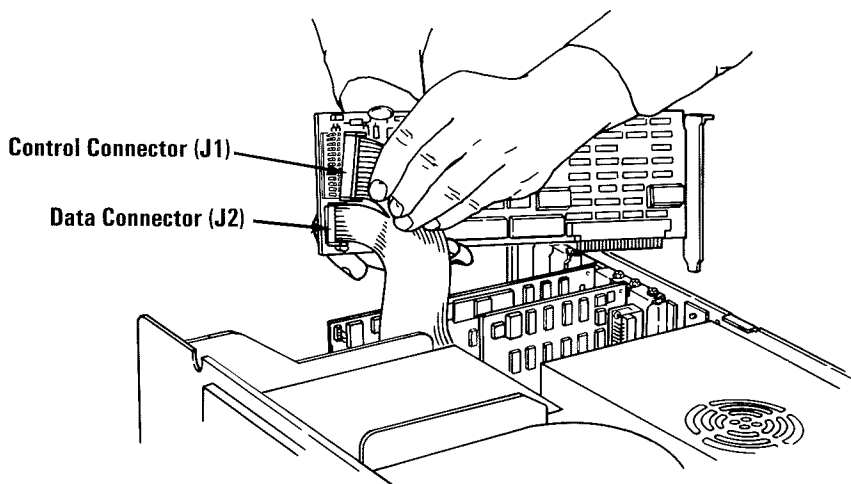
Fixed Disk Drive Adapter Replacement (cont.)

5820

2. If two fixed disk drives are installed, connect the J3 data connector.



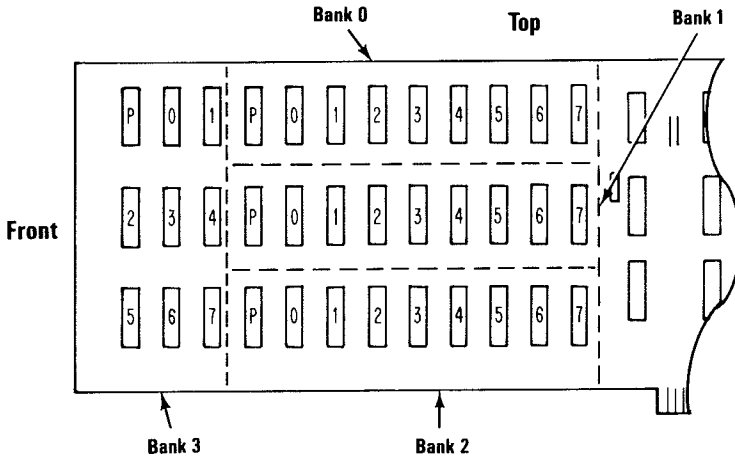
3. Connect the J1 control connector and the J2 data connector.



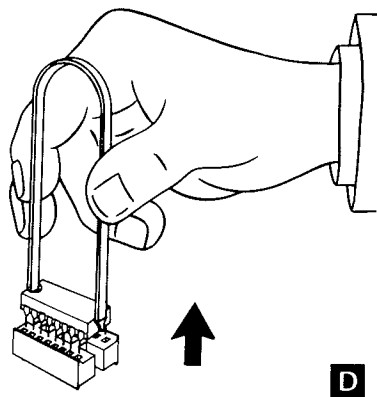
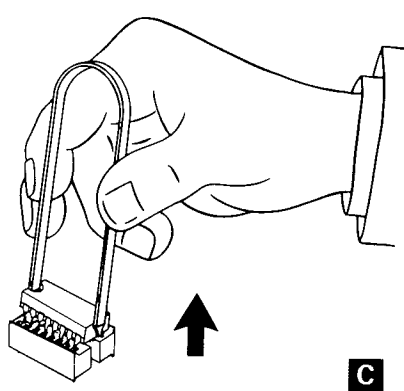
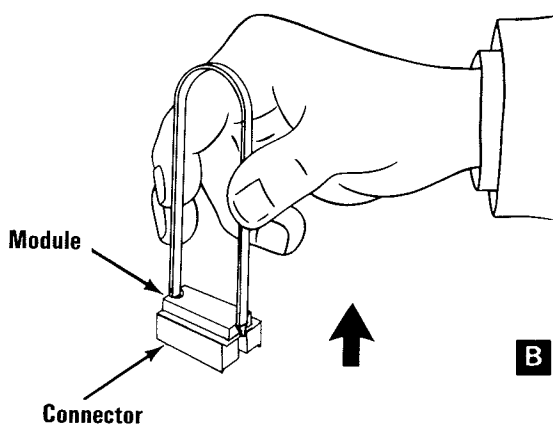
4. Insert the disk adapter into the option expansion slot. Press down firmly on the disk adapter to seat the connector.
5. Install the disk adapter mounting screw.
6. Replace the unit cover (**5900**).

1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Set all external Power switches to Off (printer, display, etc.).
3. Unplug system unit's (and expansion unit's) line cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit cover (5900).
6. Remove the 64/256KB Memory Option Adapter (5800).
7. Locate the module in bank 0, bank 1, bank 2, or bank 3 to be removed. (If you are not certain which module needs to be replaced, refer to PIC 3-200-1, "Memory" to determine which module is failing.)

Note: If the module to be replaced is on the system board, see Memory Module Removal (5920).



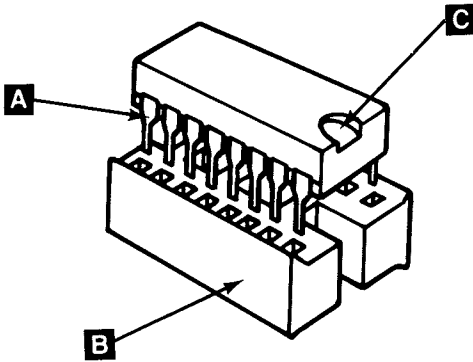
8. To separate the module from the connector, grasp the module as shown in **B**. Lift in a two step motion, as shown in **C** and **D**, to avoid bending pins.



64KB Memory Module Replacement

5830

1. Align the module pins **A** with the connector **B** and firmly press the module into place. Notch **C** on the module should be aligned with the notch in the connector.
2. Replace all option adapters (**5800**). Use the notes you made in the removal procedure to replace the option adapters in the right slots.
3. Replace the system unit cover (**5900**).
4. Recable the system.

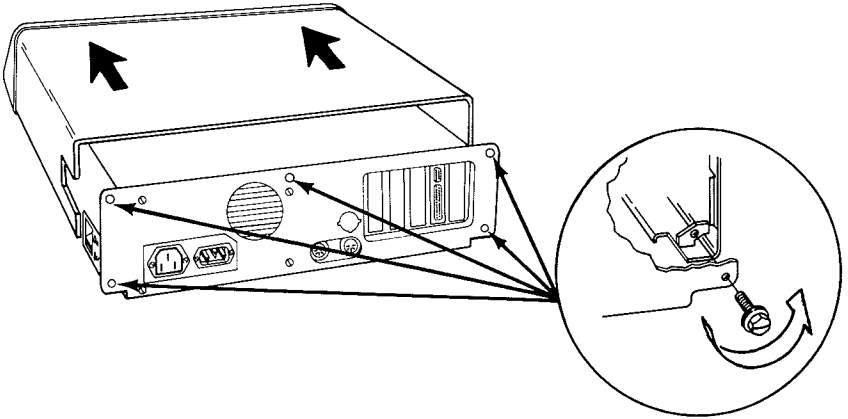


System Unit

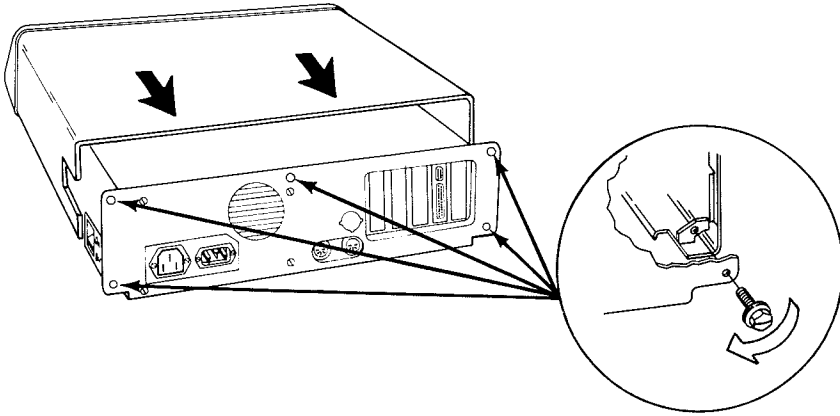
Cover Removal

5900

1. Set the system unit Power switch to Off, then unplug power cord and disconnect all cables from the rear of the unit.
2. Set all external options away from the work surface.
3. Remove the cover mounting screws and slide the cover towards the front until it clears the unit.

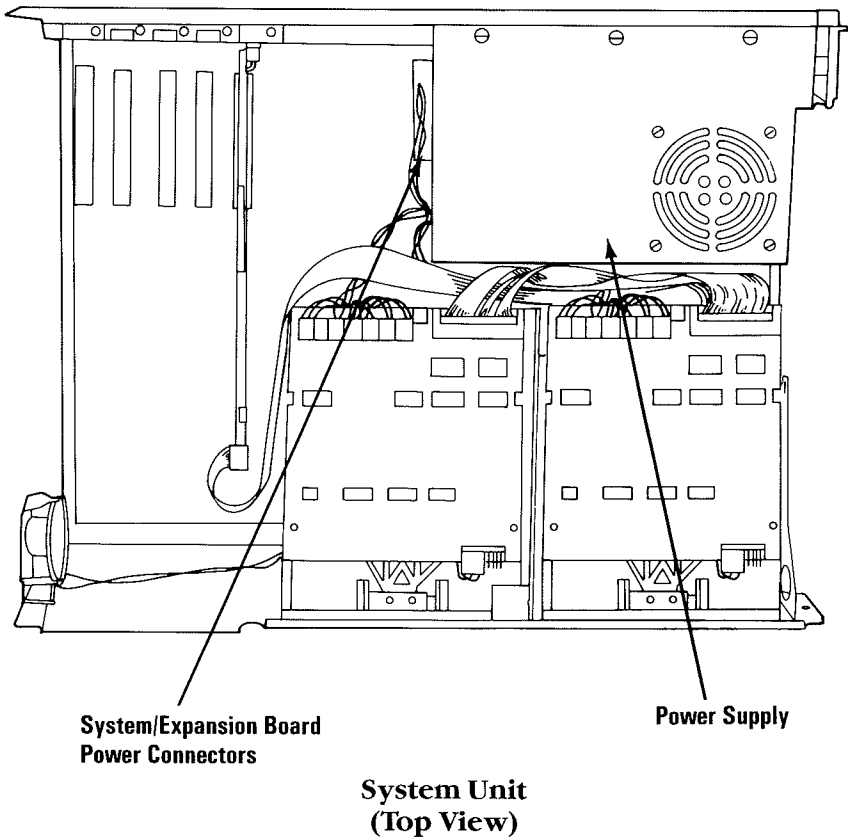


1. Slide the cover towards the rear of the unit.
2. Align the mounting screws with the threaded tabs and tighten.
3. Reconnect the cables to the system unit.



1. Set the Power switch on the system unit (and the expansion unit, if attached) to Off.
2. Unplug system unit's (and expansion unit's) power cord(s) from the wall outlet, then unplug the power cord from the rear of the system/expansion unit.
3. Remove the system/expansion unit cover (**5900**).
4. Disconnect the system/expansion board power connectors by grasping the connectors and pulling straight up.

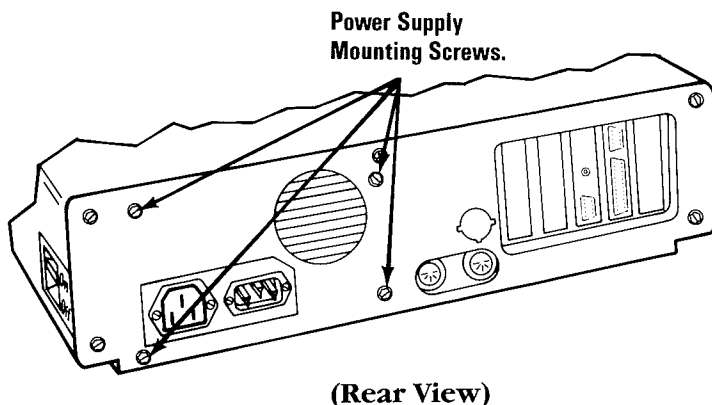
WARNING: Do not pull on the wires when disconnecting connectors.



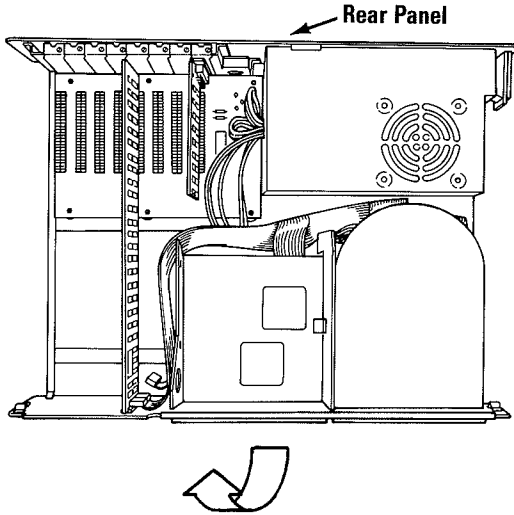
5. Disconnect the fixed disk drive/diskette drive power connectors. See Section 4, "Locations."
6. Remove the four power supply mounting screws.

If you are replacing the system unit power supply, continue with step 11.

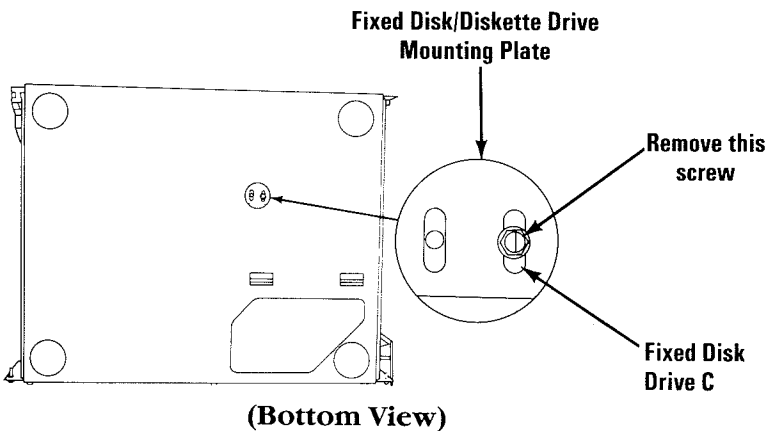
If you are replacing the expansion unit power supply, continue with step 7.



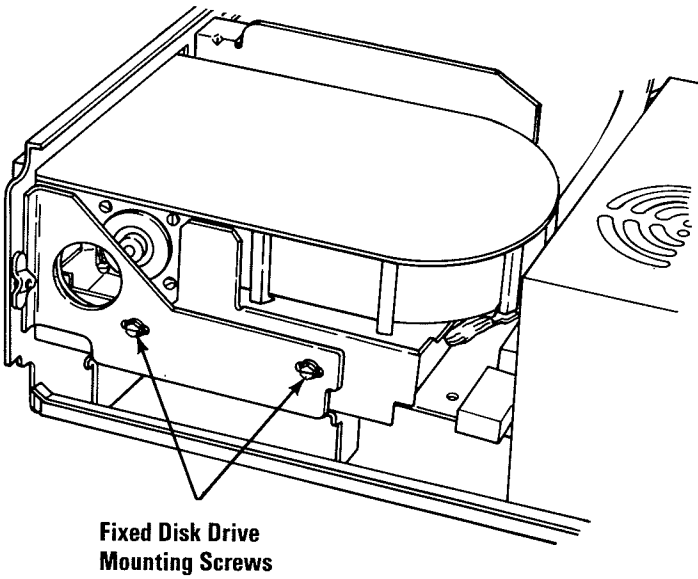
7. Hold the expansion unit by the front panel and tilt up until it rests on the rear panel.



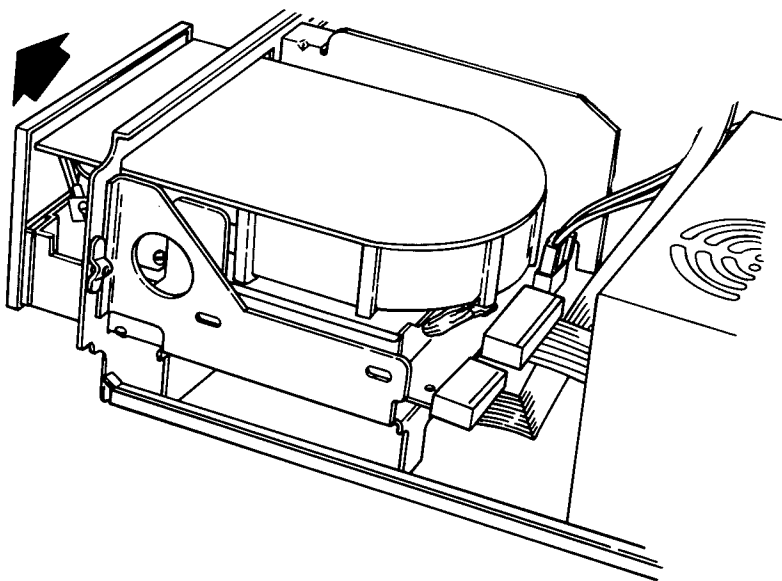
8. Remove the fixed disk mounting plate screw (turn counterclockwise) with a flat-blade screwdriver or 3/16" nutdriver.



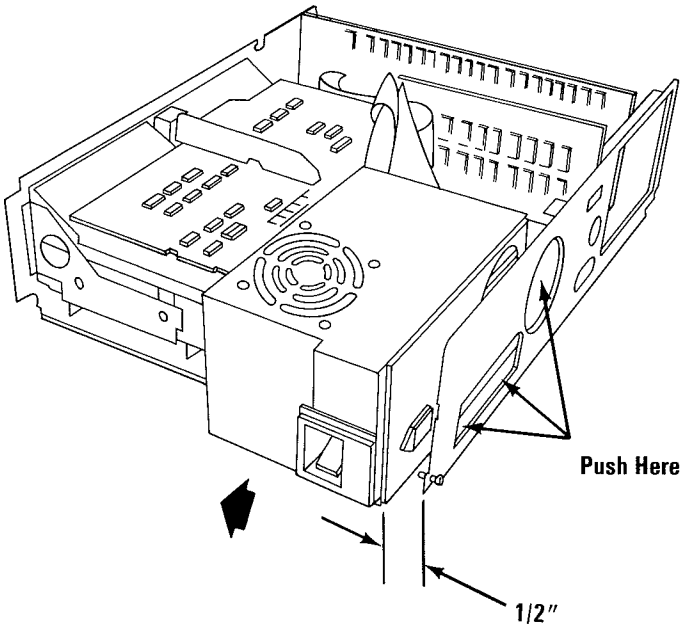
9. Remove the 2 fixed disk drive mounting screws.



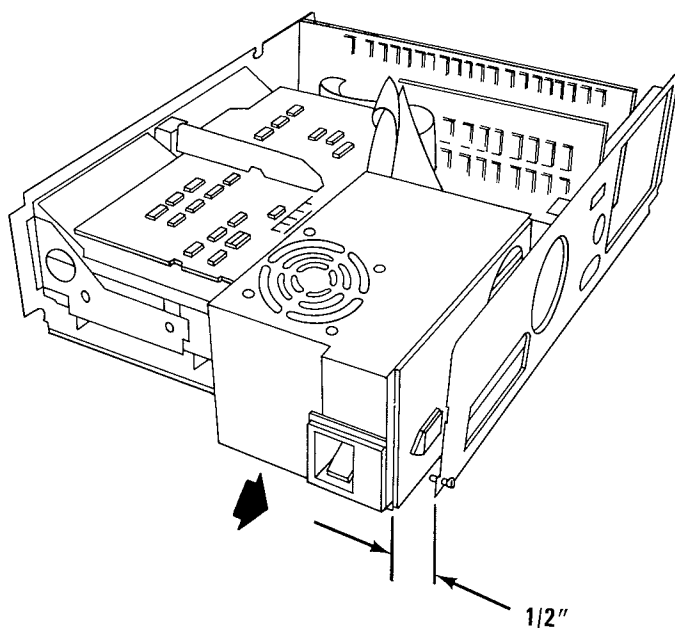
10. Slide the fixed disk drive assembly to the front of the machine about one inch.



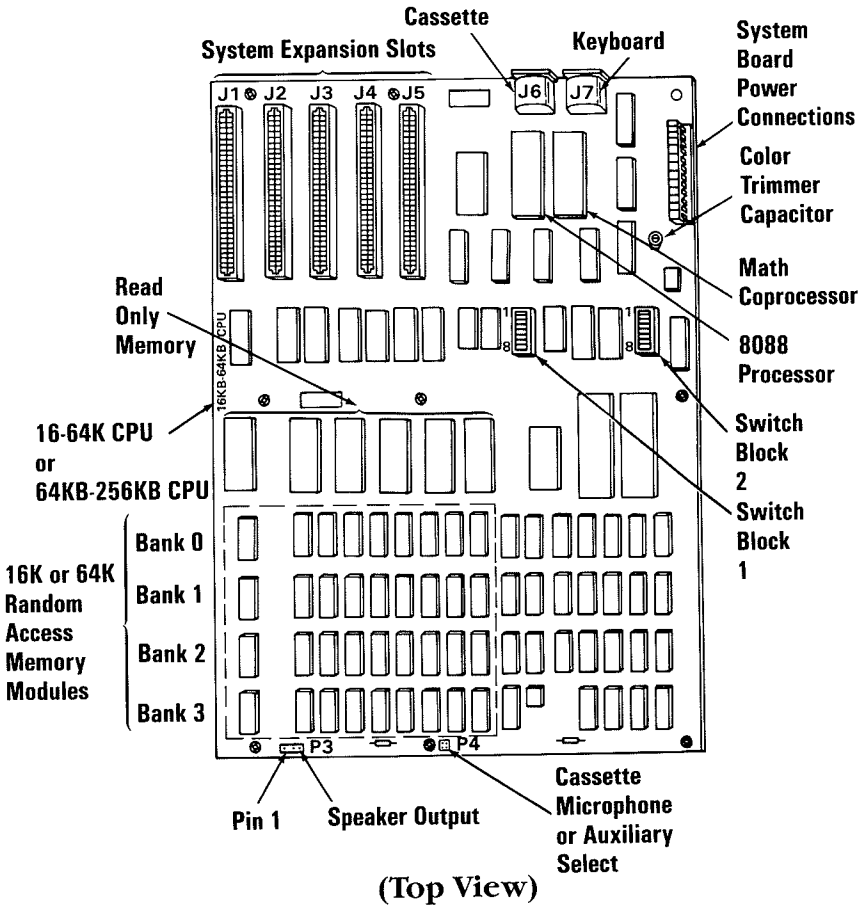
11. Push the power supply forward about 1/2" lift up and remove.



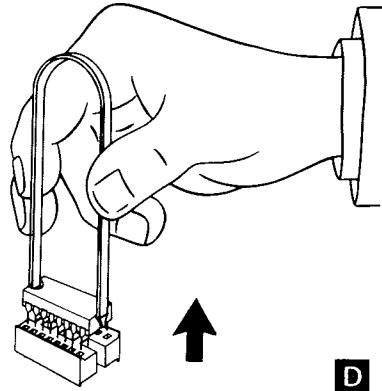
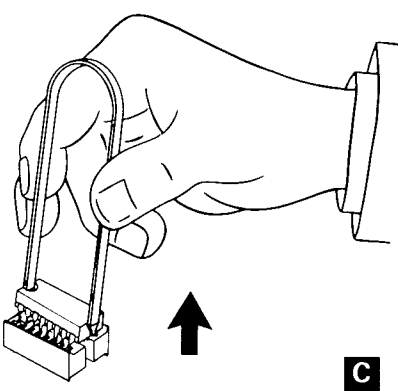
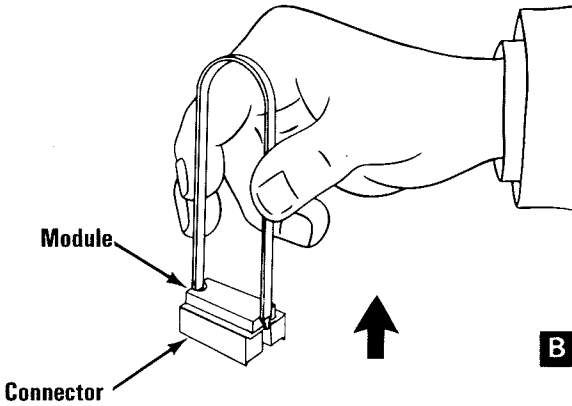
1. Position the power supply about 1/2" from the rear of the system/expansion unit back plate and slide into position.
2. Align the screw holes in the power supply with the rear frame.
3. Replace and tighten the four power supply mounting screws.
4. Reinstall the fixed disk drive if removed (expansion unit), and reconnect the fixed disk drive/diskette drive power connectors.
5. Reinstall the system/expansion board power connectors.
6. Replace fixed disk drive (**5200**).
7. Replace unit cover (**5900**).
8. Reconnect cables to the unit.



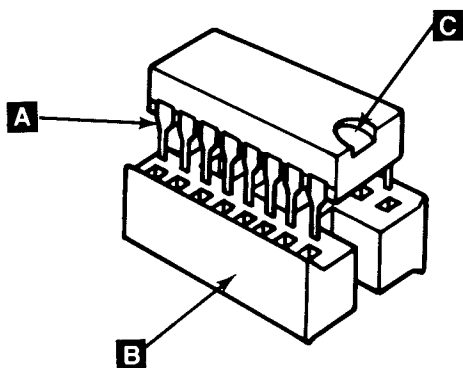
1. Set the Power switch on the system unit (and the expansion unit, if attached) to Off.
2. Set all external Power switches to off (printer, display, etc.).
3. Unplug system unit's (and expansion unit's) line cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit cover (5900).
6. Remove all the option adapters from the system unit (5800). Make a note of the slot from which you remove each adapter.
7. Locate the module to be removed. (If you are not certain which module needs to be replaced see PIC 3-200-1, "Memory" to determine which module is failing.)



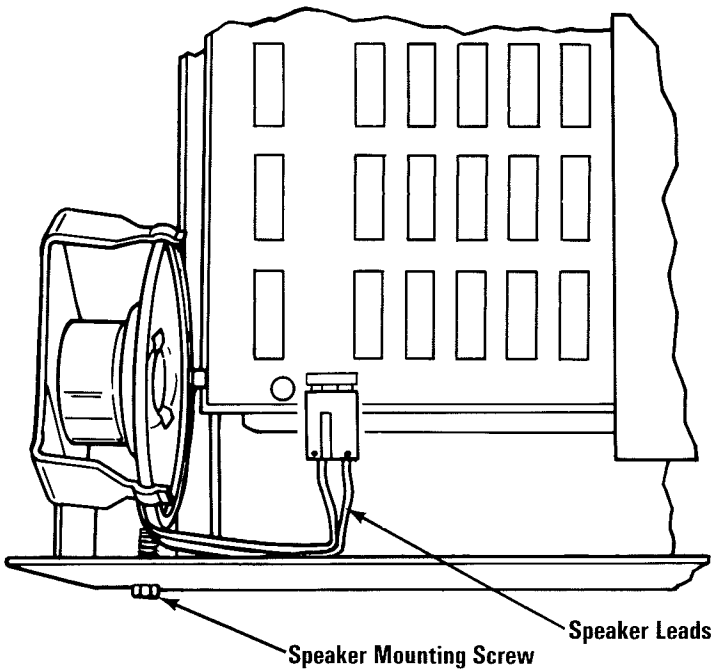
8. To separate the module from the connector, grasp the module as shown in **B**. Lift in a two step motion, as shown in **C** and **D**, to avoid bending pins.



1. Align the module pins **A** with the connector **B** and firmly press the module into place. Notch **C** on the module should be aligned with the notch in the connector.
2. Replace all option adapters (**5800**). Use the notes you made in the removal procedure to replace the option adapters in the right slots.
3. Replace the system unit cover (**5900**).
4. Recable the system.

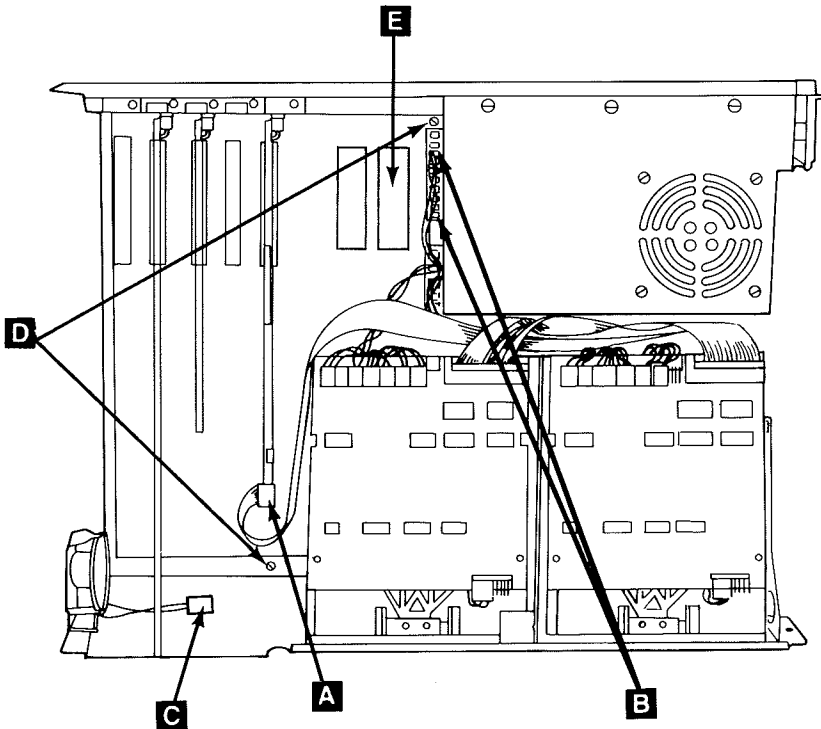


1. Set system unit Power switch to Off.
2. Remove system unit power cord from the wall outlet.
3. Remove the system unit cover (**5900**).
4. Disconnect the speaker leads.
5. Remove the speaker mounting screw.
6. Remove the speaker.

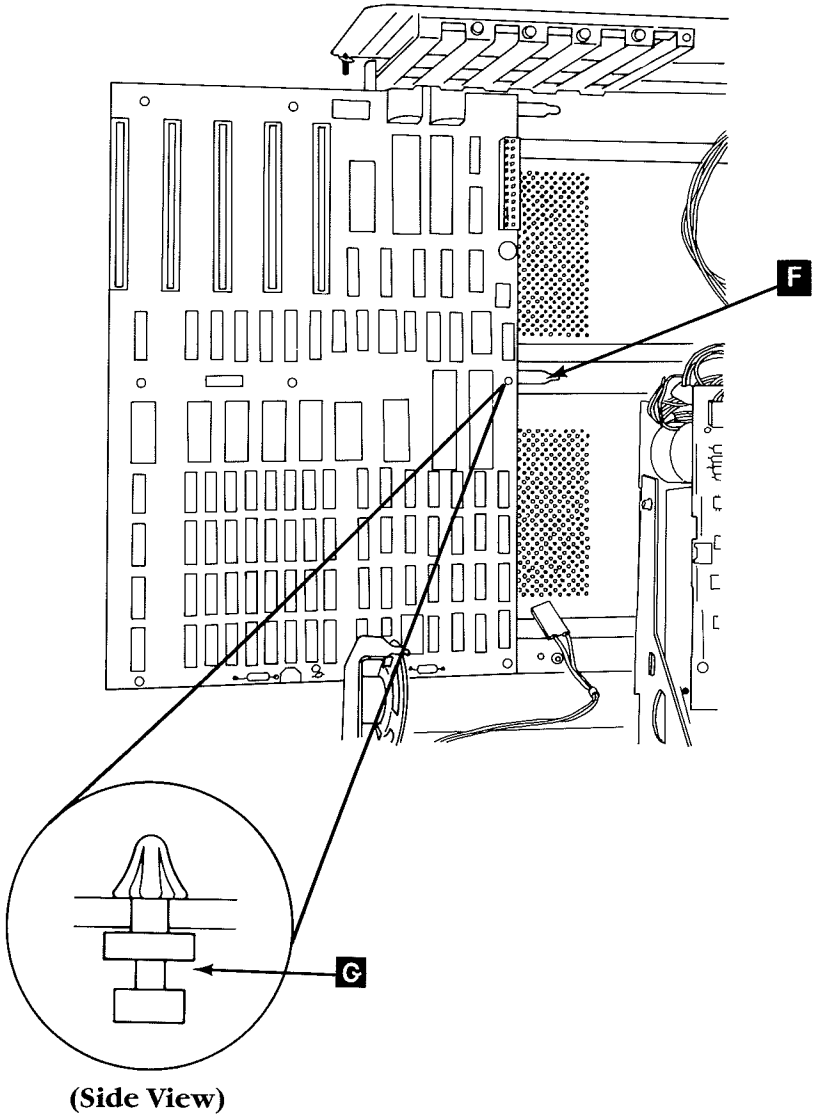


(Top View)

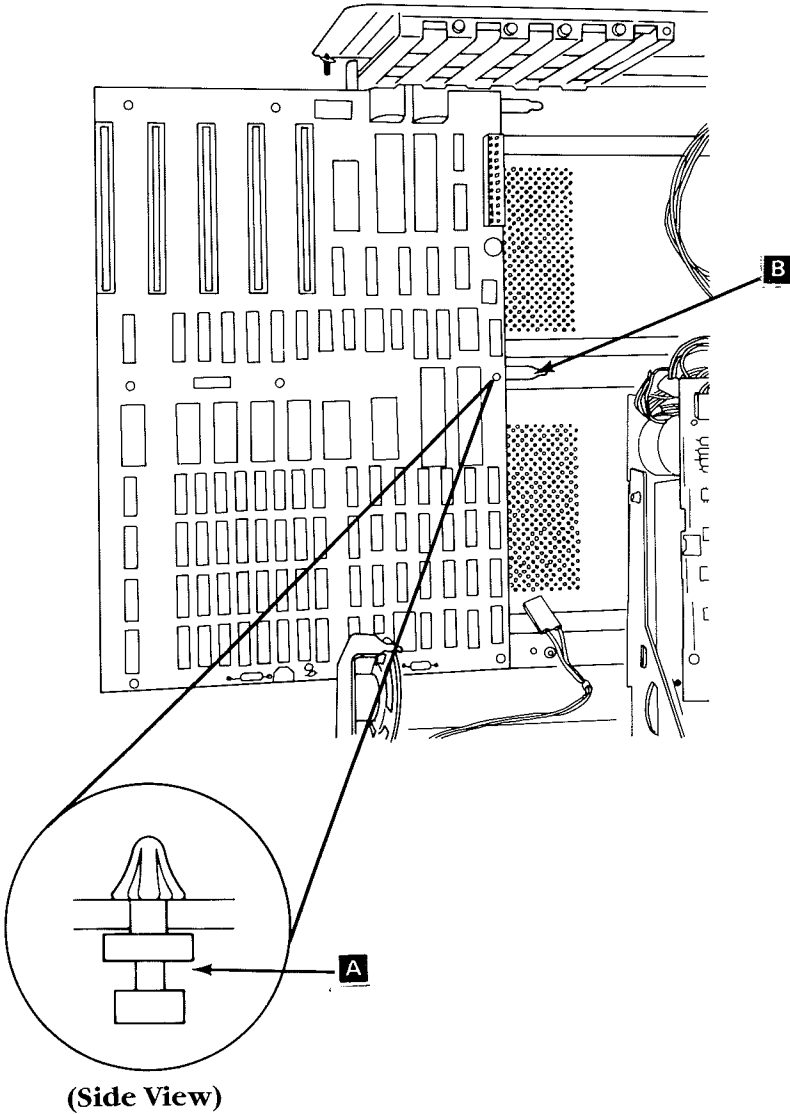
1. Set the Power switch on the system unit (and expansion unit, if attached) to Off.
2. Unplug system unit's (and expansion unit's if attached) power cord(s) from the wall outlet and disconnect all cables from the rear of the system unit.
3. Remove system unit cover (5900).
4. Remove all option adapters (5800) (5810).
5. Disconnect diskette drive signal cable **A** and system board power connectors **B**.
6. Remove the Math Coprocessor, if installed (5950) **E**.
7. Remove speaker connector **C**.
8. Remove system board mounting screws **D**.



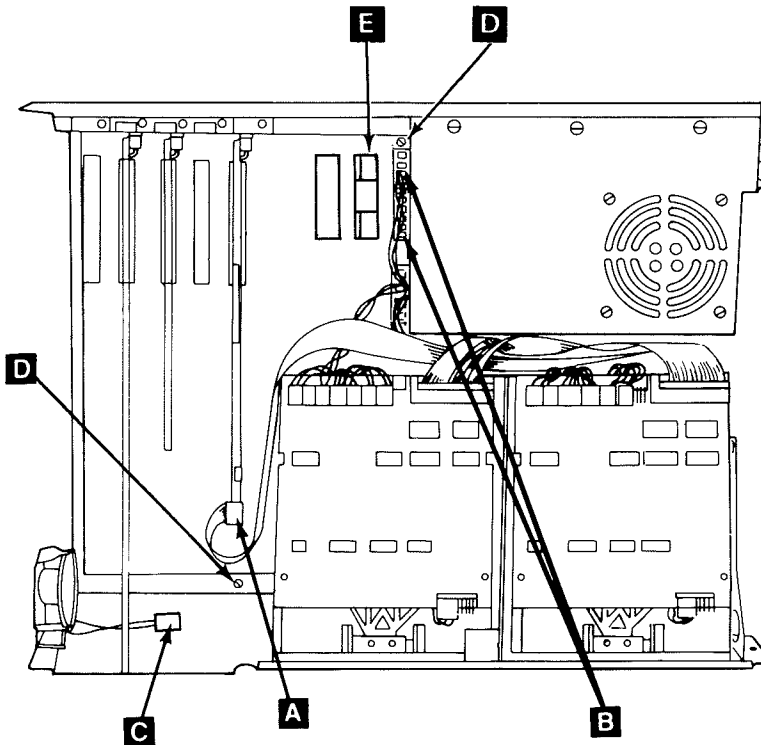
8. Slide the system board away from the power supply (approximately 1/2" until stand-offs **G** can be lifted from mounting slots **F**).
9. Lift the system board up and out of the system unit.



1. Position the stand-offs **A** on the system board into the mounting slots **B**.



2. Slide the system board toward the power supply until the holes for the two mounting screws are aligned.
3. Install the two system board mounting screws **D**.
4. Install the speaker connector **C**.
5. Install the Math Coprocessor, if removed (5950) **E**.
6. Install the system board power connectors **B**.
7. Install the option adapters (5800).
8. Install the diskette drive signal cable **A**.
9. Install the system unit cover (5900).
10. Reconnect all cables to the rear of the system unit.

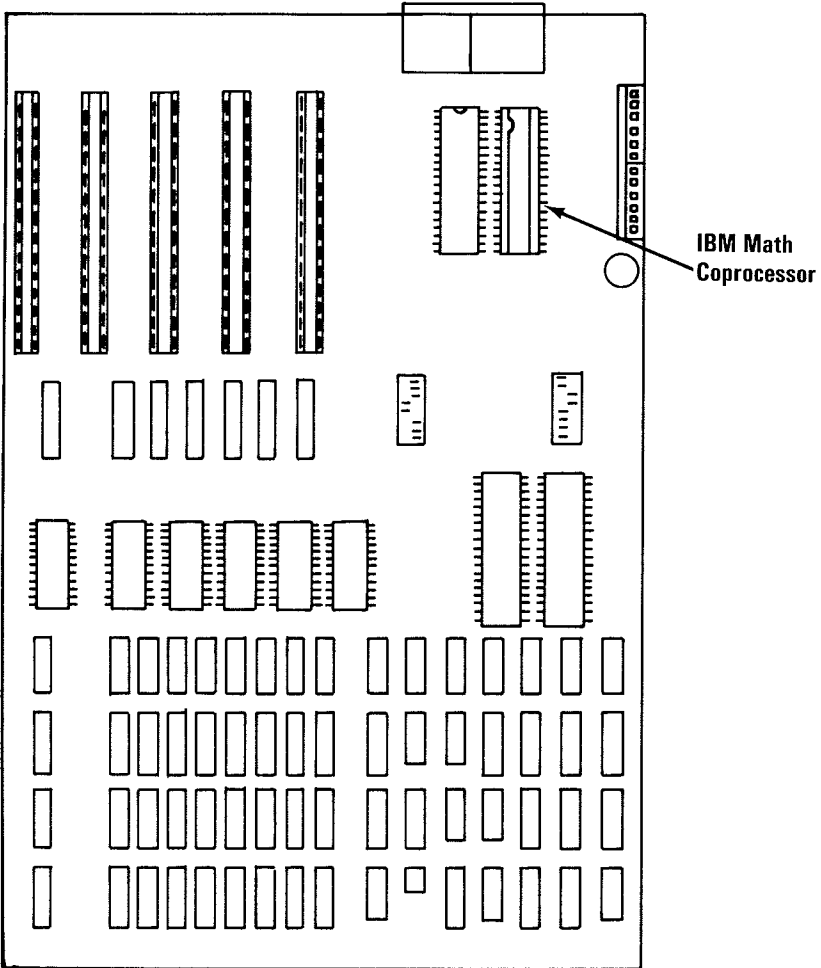


WARNING: The pins on the coprocessor are easily bent. Be careful not to bend the pins when removing the coprocessor.

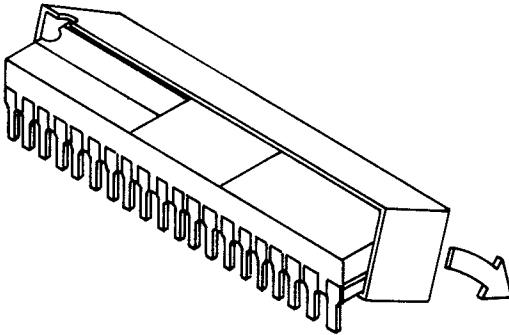
The coprocessor is static sensitive. Maintain personal grounding by touching the system unit frame with one hand while removing the coprocessor.

1. Set the Power switch on the system unit (and the expansion unit, if attached) to Off.
2. Set all external Power switches to off (printer, TV, etc).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Disconnect all cables from the rear of the system unit.
5. Remove the system unit cover (**5900**).

6. Unplug the power supply connectors from the system board and position them out of the way.
7. Locate the Math Coprocessor on the system board shown below.

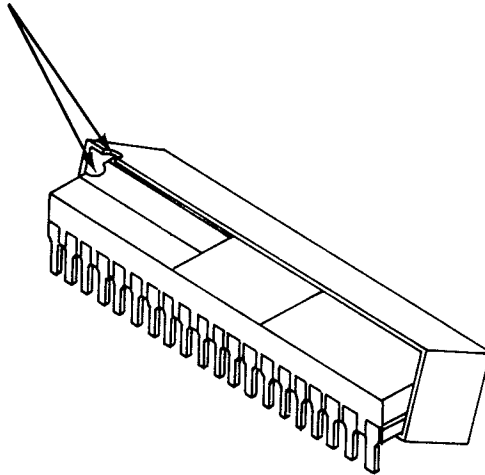


- 8. Using a module puller, carefully remove the coprocessor.
- 9. Remove the safety protector.



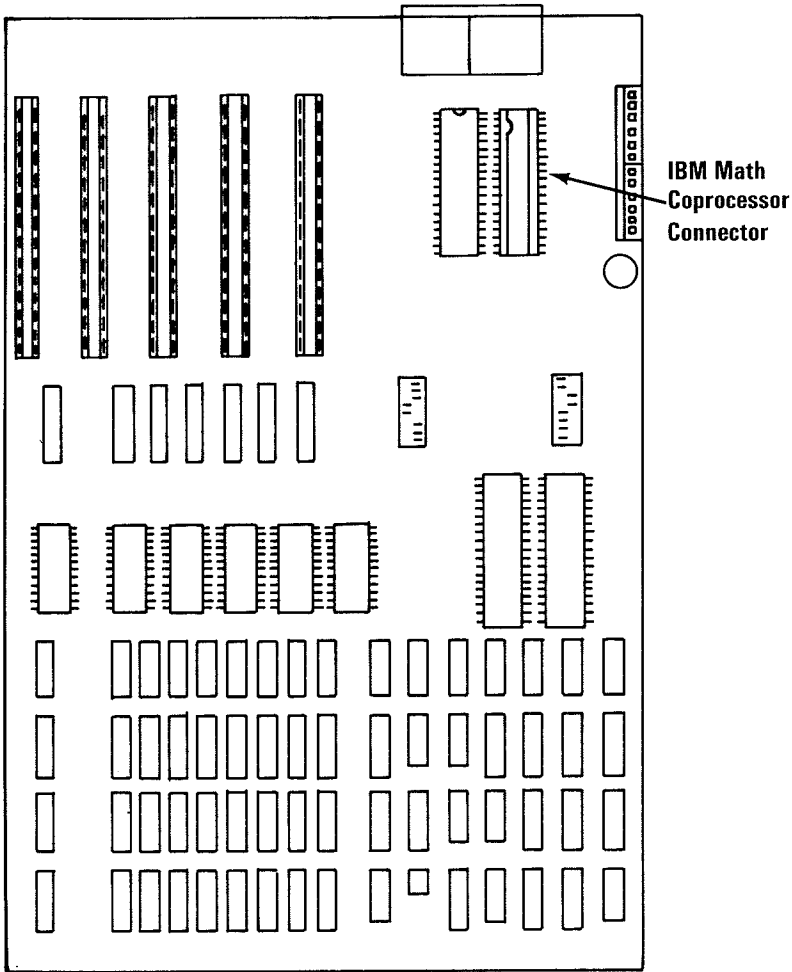
1. Install the safety protector on the coprocessor. Make sure the notches in the safety protector are on the same end as the notch in the coprocessor. The overlapped portions of the safety protector should be on the bottom or pin side of the coprocessor (**5970**).

Notches



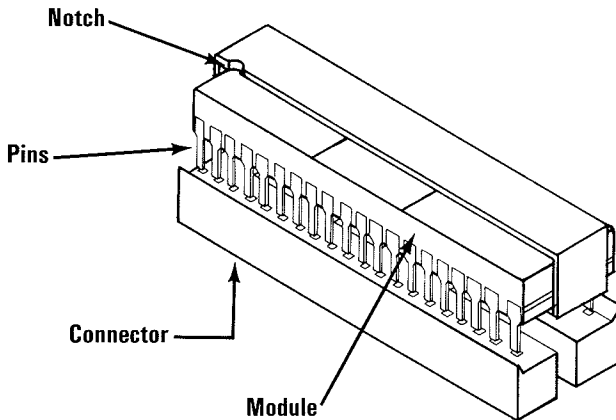
Math Coprocessor Replacement (cont.) 5950

2. Locate the Math Coprocessor connector on the system board shown below.



Math Coprocessor Replacement (cont.) 5950

3. Carefully align the pins on the coprocessor with its connector and firmly press the coprocessor in place. Be sure the notch on the safety protector is facing toward the 8088 processor.
4. Check to be sure the switch block 1 switch 2 on the system board, is in the OFF position.



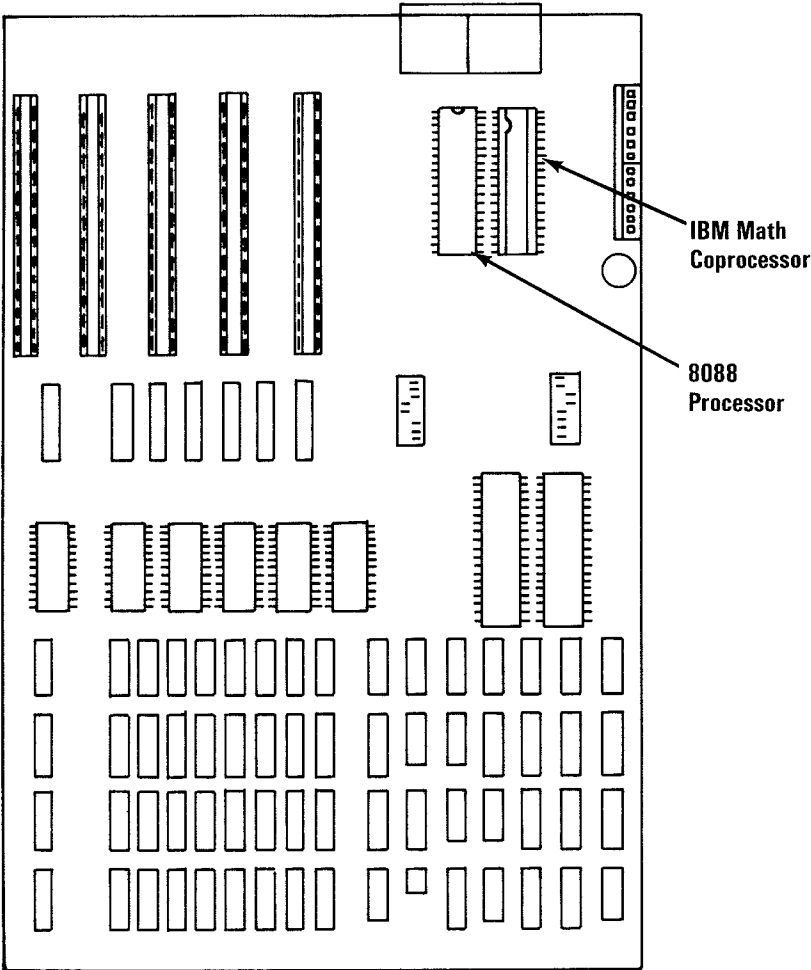
5. Reconnect the power supply connectors.
6. Replace the system unit cover (**5900**).
7. Reconnect all cables.

Warning: The pins on the processor module are easily bent. Be careful not to bend the pins when removing the processor.

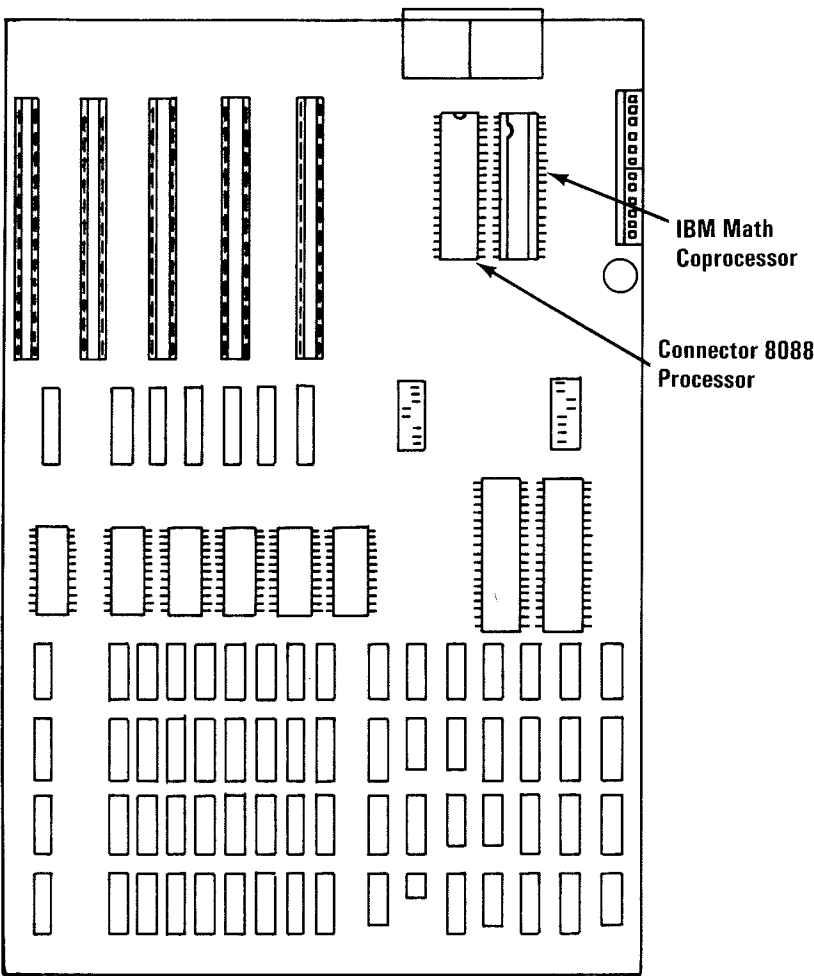
The processor is static sensitive. Maintain personal grounding, by touching the system unit frame with one hand, while removing the processor.

1. Set the Power switch on the system unit (and the expansion unit, if attached) to Off.
2. Set all external Power switches to off (printer, TV, etc.).
3. Unplug the system unit's (and expansion unit's) power cord(s) from the wall outlet.
4. Remove the system unit cover (**5900**).

- 5. Unplug the power supply connectors from the system board and position them out of the way.
- 6. Locate the processor on the system board shown below.
- 7. Using a module puller, carefully remove the processor.



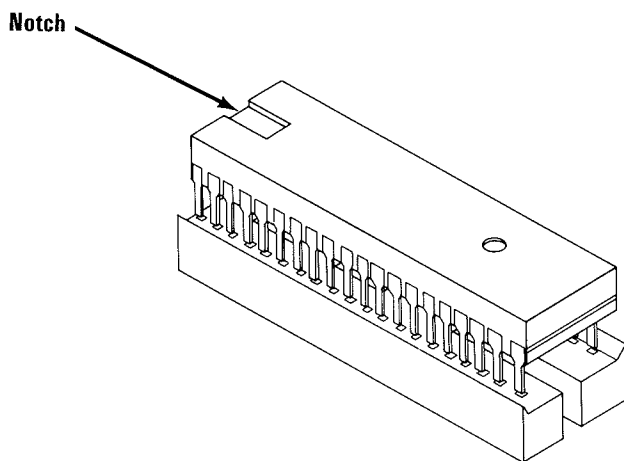
- 1. Locate the 8088 processor connector on the system board shown below.



Warning: The pins on the processor module are easily bent. Be careful not to bend the pins when installing the processor.

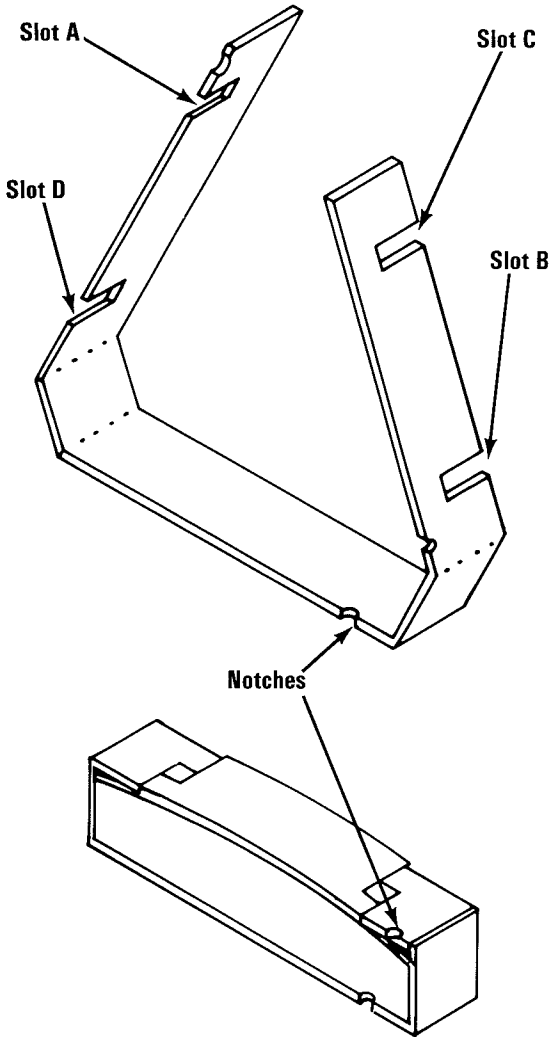
The processor is also static sensitive. Maintain personal grounding, by touching the system frame with one hand, while installing the processor.

2. Carefully align the pins on the processor with its connector and firmly press the processor in place. Be sure the notch on the 8088 processor is facing the rear of the system board.



3. Replace the system unit cover (5900).
4. Reconnect all cables.

1. Assemble the safety protector as shown in the figure below.
2. Insert slot A into B then insert C into slot D.



SECTION 6. SWITCH SETTINGS

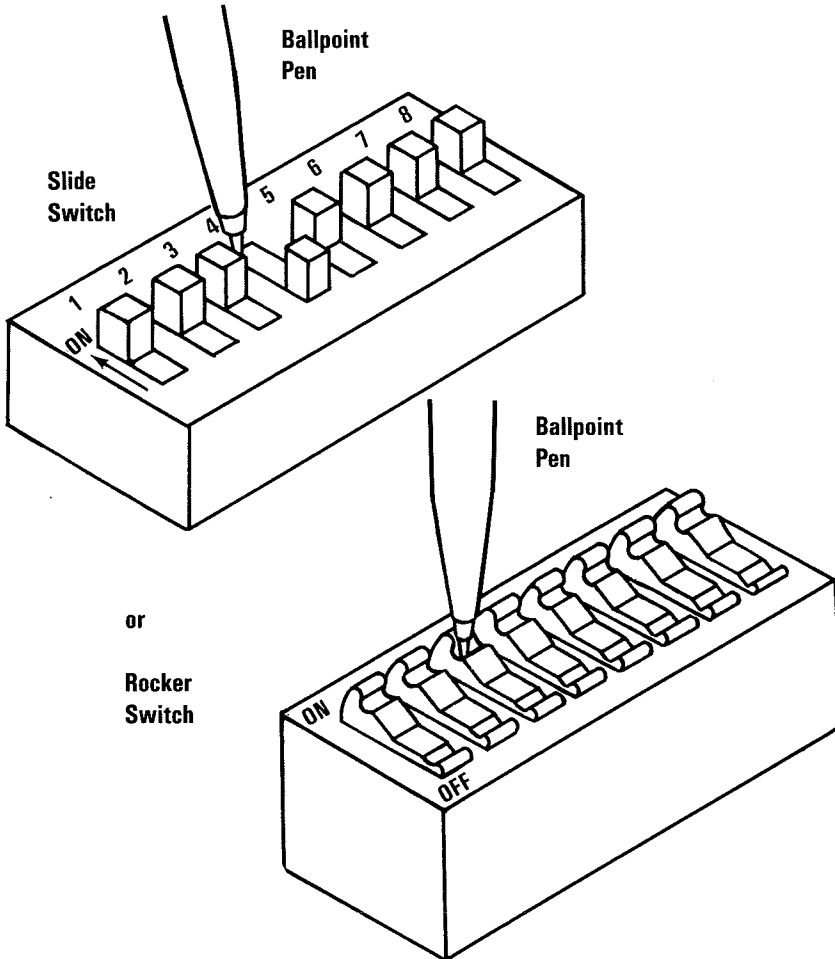
System Board Switch Settings	6-3
System Board Switches	6-3
Monitor Type Switch Settings	6-4
5 1/4" Diskette Drive Switch Setting	6-4
Extender Card Switch Settings	6-5
Memory Option Switch Settings	6-6
(16KB-64KB CPU) System Board	6-6
(64KB-256KB CPU) System Board	6-25

Note: The system board type (16KB-64KB CPU or 64KB-256KB CPU) is printed on the left edge of the system board. See Section 4, "Locations."

Switches in your system are set to reflect the addition of memory and other installed options. Switches are located on the system board, extender card, and memory expansion options.

The switches are dual inline pin (dip) switches that can be easily set with a ballpoint pen. Refer to the diagrams below to familiarize yourself with the different types of switches that may be used in your system.

Refer to the charts on the following pages to determine the correct switch setting for your system.

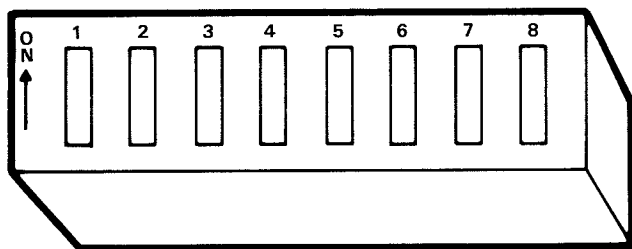


Note: Set a rocker switch by pressing down the rocker to the desired position.

System Board Switch Settings

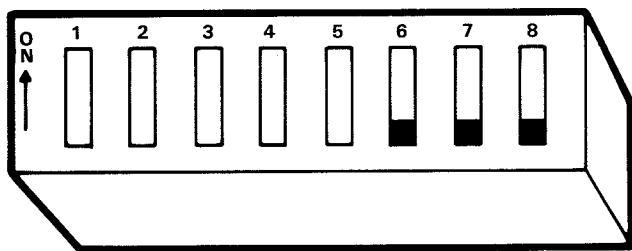
The switches on the system board are set as shown in the following figure. These settings are necessary for the system to address the attached components, and to specify the amount of memory installed on the system board.

Switch Block 1



Position	Function
1-7-8	Number of 5 1/4" Diskette Drives Installed
2	Math Coprocessor: ON if coprocessor is installed (must be OFF if coprocessor is not installed)
3-4	Amount of memory on the system board
5-6	Type(s) of display adapter(s) installed

Switch Block 2



Position	Function
1-2-3-4-5	Amount of memory options installed
6-7-8	Always in the OFF position

Monitor Type Switch Settings

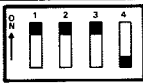
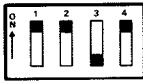




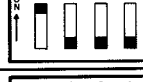

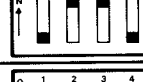

	Switch Block 1	Switch Block 2
No Monitor		
IBM Monochrome Display or more than one monitor		
40x25 Color		
80x25 Color		

Note: The 80x25 color setting, when used with home television and various monitors, can cause loss of character/quality.

5 1/4" Diskette Drive Switch Settings



	Switch Block 1	Switch Block 2
0 – Drives		
1 – Drive		
2 – Drives		

Extender Card Switch Settings

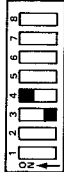

System Memory	Extender Card Switch Block	Memory Segment
16K to 64K		1
96K to 128K		2
160K to 192K		3
224K to 256K		4
288K to 320K		5
352K to 384K		6
416K to 448K		7
480K to 512K		8
544K to 576K		9
608K to 640K		A

Memory Switch Settings (16KB-64KB CPU) System Board


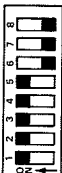
16K Total Memory

System Board Switches		
	Switch Block 1	Switch Block 2

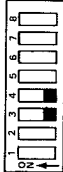
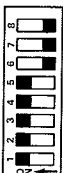
32K Total Memory

System Board Switches		
	Switch Block 1	Switch Block 2


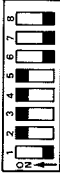
48K Total Memory


System Board Switches		
	Switch Block 1	Switch Block 2

64K Total Memory

System Board Switches		
	Switch Block 1	Switch Block 2

**96K Total Memory
32K + (64K on System Board)**


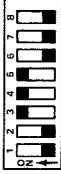

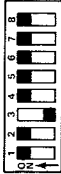


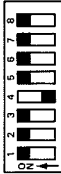
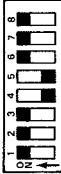

System Board Switches		
	Switch Block 1	Switch Block 2

1 - 32K option	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
			




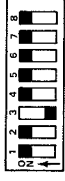










128K Total Memory
64K + (64K on System Board)

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 64K installed		64K Option Card Switches
1 - 64K option		32K Option Card Switches
2 - 32K options		

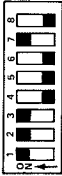


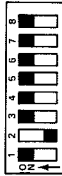
**160K Total Memory
96K + (64K on System Board)**

System Board Switches	Switch Block 1 	Switch Block 2 
1 - 64/256K option with 64K installed 1 - 32K option	64/256K Option Card Switches 	32K Option Card Switches 
1 - 64K option 1 - 32K option		
3 - 32K options		  

**192K Total Memory
128K + (64K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 64K option installed 1 - 64K option		
2 - 64K options	 	 
1 - 64/256K option with 64K installed 2 - 32K options		 
1 - 64K option 2 - 32K options		 
1 - 64/256K option with 128K installed		





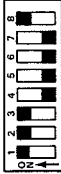

**288K Total Memory
224K + (64K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 1 - 32K option		
1 - 64/256K option with 128K installed 1 - 64K option 1 - 32K option		

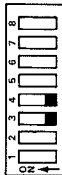


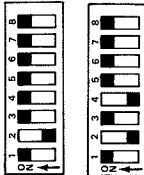
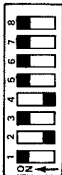
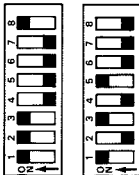
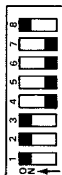

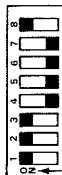
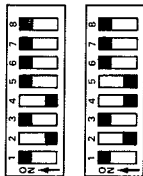
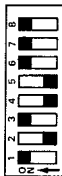
**320K Total Memory
256K + (64K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 128K installed 2 - 64K options		
1 - 64/256K option with 192K installed 1 - 64K option		
1 - 64/256K option with 192K installed 2 - 32K options		
1 - 64/256K option with 256K installed		

**352K Total Memory
288K + (64K on System Board)**

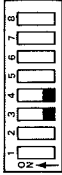
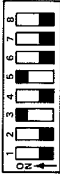
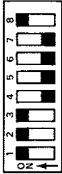

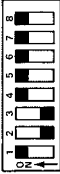


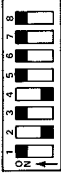
System Board Switches	Switch Block 1 	Switch Block 2 
1 - 64/256K option with 192K installed 1 - 64K option 1 - 32K option	64/256K Option Card Switches 	64K Option Card Switches 
1 - 64/256K option with 256K installed 1 - 32K option		32K Option Card Switches 

384K Total Memory 320K + (64K on System Board)

System Board Switches	Switch Block 1	Switch Block 2	
			
1 - 64/256K option with 192K installed 2 - 64K options		 	32K Option Card Switches
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed			
1 - 64/256K option with 256K installed 1 - 64K option			
1 - 64/256K option with 256K installed 2 - 32K options		 	

256
128
384

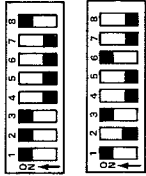

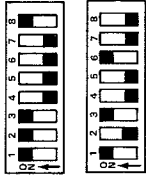

416K Total Memory
352K + (64K on System Board)

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 32K option	 	
1 - 64/256K options with 256K installed 1 - 64K option 1 - 32K option	 	






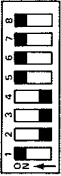


**448K Total Memory
384K + 164K on System Board**

System Board Switches	Switch Block 1	Switch Block 2	
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 64K option	 		32K Option Card Switches
1 - 64/256K option with 256K installed 2 - 64K options	 	 	
1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed	 		



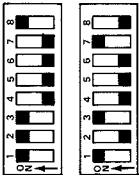

**480K Total Memory
416K + (64K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
<p>1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed 1 - 32K option</p>	<p>64/256K Option Card Switches</p> 	<p>64K Option Card Switches</p> 
	<p>64/256K Option Card Switches</p> 	<p>32K Option Card Switches</p> 








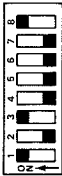
512K Total Memory
448K + (64K on System Board)

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed 1 - 64K option	  	
1 - 64/256K option with 256K installed 1 - 64/256K option with 192K installed	 	



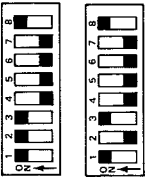

**544K Total Memory
480K + (64K on System Board)**

System Board Switches	Switch Block 1 	Switch Block 2 
<p>1 - 64/256K option with 256K installed 1 - 64/256K option with 192K installed 1 - 32K option</p>	<p>64/256K Option Card Switches</p> 	<p>64K Option Card Switches</p> <p>32K Option Card Switches</p> 



576K Total Memory
512K + (64K on System Board)







System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 256K installed 1 - 64/256K option with 192K installed 1 - 64K option	  	
2 - 64/256K option with 256K installed	 	

**608K Total Memory
544K + (64K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
		
<p>2 - 64/256K option with 256K installed 1 - 32K option</p>	<p>64/256K Option Card Switches</p> 	<p>32K Option Card Switches</p> 



640K Total Memory
576K + (64K on System Board)

System Board Switches	Switch Block 1	Switch Block 2
		

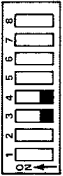

	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
2 - 64/256K option with 256K installed 1 - 64K option	 		
2 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed	  		

Memory Switch Settings (64KB-256KB CPU) System Board



64K Total Memory

System Board Switches		Switch Block 2	
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128K Total Memory

System Board Switches		Switch Block 2	
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192K Total Memory

System Board Switches		Switch Block 2	
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256K Total Memory

System Board Switches		Switch Block 2	
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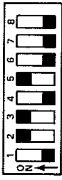

288K Total Memory
32K + (256K on System Board)

System Board Switches		Switch Block 2	
1 - 32K option	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
			

**320K Total Memory
64K + (256K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 64K installed		64K Option Card Switches
1 - 64K option		32K Option Card Switches
2 - 32K options		

352K Total Memory 96K + (256K on System Board)

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 64K installed 1 - 32K option		
1 - 64K option 1 - 32K option		64K Option Card Switches
3 - 32K options		32K Option Card Switches

**384K Total Memory
128K + (256K on System Board)**

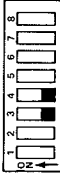
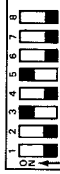


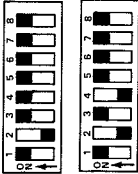
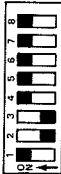


point to 32K

*00
12345678
00000000*

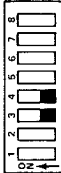



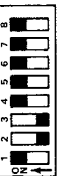


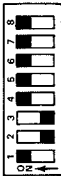






System Board Switches	Switch Block 1	Switch Block 2

	64/256K Option Card Switches	64K Option Card Switches	32K Option Card Switches
1 - 64/256K option with 64K installed 1 - 64K option			
2 - 64K options			
1 - 64/256K option with 64K installed 2 - 32K options			
1 - 64K option 2 - 32K options			
1 - 64/256K option with 128K installed			




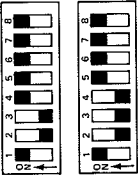
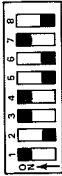


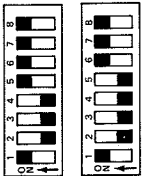

**416K Total Memory
160K + (256K on System Board)**

System Board Switches	Switch Block 1 	Switch Block 2 
1 - 64/256K option with 64K installed 1 - 64K option 1 - 32K option	64/256K Option Card Switches 	32K Option Card Switches 
2 - 64K options 1 - 32K option		
1 - 64/256K option with 128K installed 1 - 32K option		


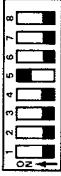





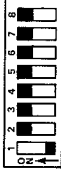

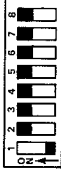
**448K Total Memory
192K + (256K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 192K installed		
1 - 64/256K option with 128K installed 1 - 64K option		
1 - 64/256K option with 64K installed 2 - 64K options		 
3 - 64K options		  
1 - 64/256K option with 128K installed 2 - 32K options		 





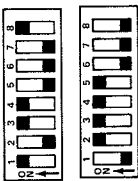



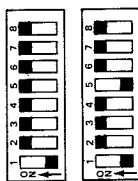
**512K Total Memory
256K + (256K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 128K installed 2 - 64K options		
1 - 64/256K option with 192K installed 1 - 64K option		
1 - 64/256K option with 192K installed 2 - 32K options		
1 - 64/256K option with 256K installed		


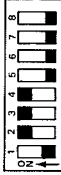
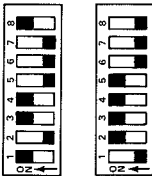



**544K Total Memory
288K + (256K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
1 - 64/256K option with 192K installed 1 - 64K option 1 - 32K option		
1 - 64/256K option with 256K installed 1 - 32K option		
	64/256K Option Card Switches	64K Option Card Switches
		
		
	32K Option Card Switches	32K Option Card Switches
		
		



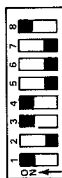

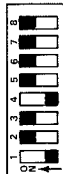
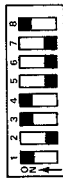

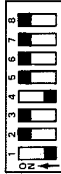


**576K Total Memory
320K + (256K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
		
	64/256K Option Card Switches	64K Option Card Switches
1 - 64/256K option with 192K installed 2 - 64K options		
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed		
1 - 64/256K option with 256K installed 1 - 64K option		
1 - 64/256K option with 256K installed 2 - 32K options		

608K Total Memory
352K + (256K on System Board)

System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 32K option	64/256K Option Card Switches 	32K Option Card Switches 
1 - 64/256K option with 256K installed 1 - 64K option 1 - 32K option		

**640K Total Memory
384K + (256K on System Board)**

System Board Switches	Switch Block 1	Switch Block 2
		
1 - 64/256K option with 256K installed 1 - 64/256K option with 64K installed 1 - 64K option	64/256K Option Card Switches  	64K Option Card Switches 
1 - 64/256K option with 256K installed 2 - 64K options	64/256K Option Card Switches 	64K Option Card Switches  
1 - 64/256K option with 256K installed 1 - 64/256K option with 128K installed	64/256K Option Card Switches  	32K Option Card Switches

Notes:

SECTION 7. PARTS CATALOG

Limited Warranty IBM Service Parts	7-2
How to Use This Parts Catalog	7-3
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Monochrome Display	7-12
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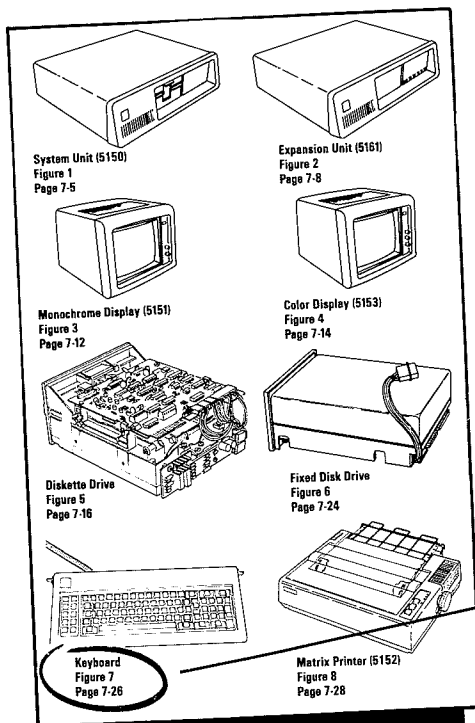
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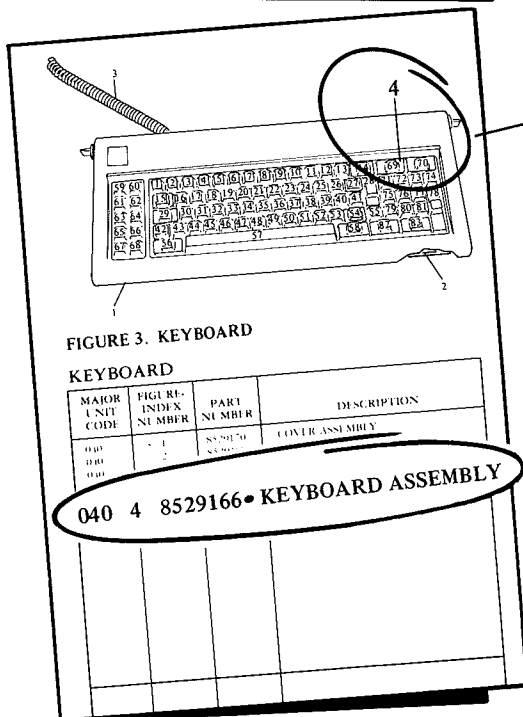
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How To Use This Parts Catalog



1

Turn to the visual index then locate, by illustration, the assembly containing the part.

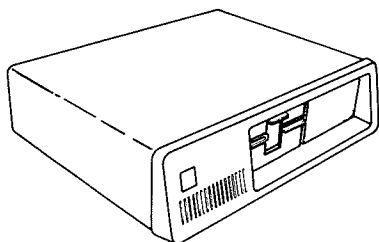


2

Turn to the page for that assembly. Then locate the part visually.

3

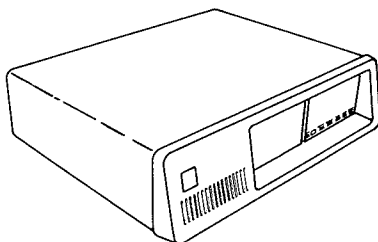
Using the index number shown with the part, refer to the accompanying listing to obtain major unit code, part number and description



System Unit (5150)

Figure 1

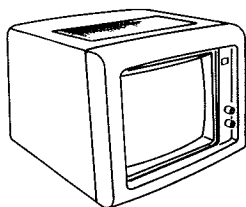
Page 7-5



Expansion Unit (5161)

Figure 2

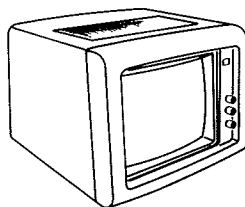
Page 7-8



Monochrome Display (5151)

Figure 3

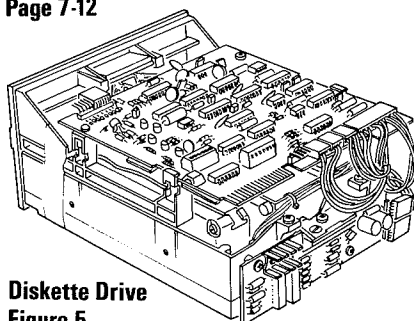
Page 7-12



Color Display (5153)

Figure 4

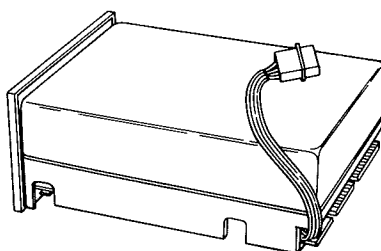
Page 7-14



Diskette Drive

Figure 5

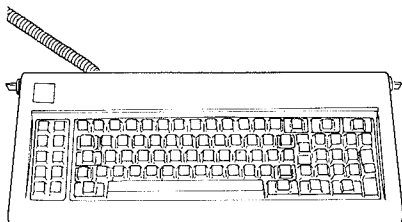
Page 7-16



Fixed Disk Drive

Figure 6

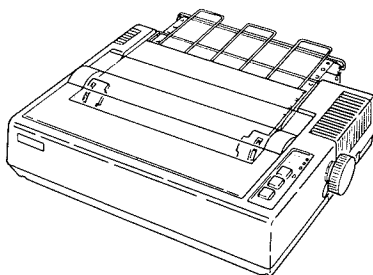
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Keyboard

Figure 7

Page 7-26



Matrix Printer (5152)

Figure 8

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Visual Index

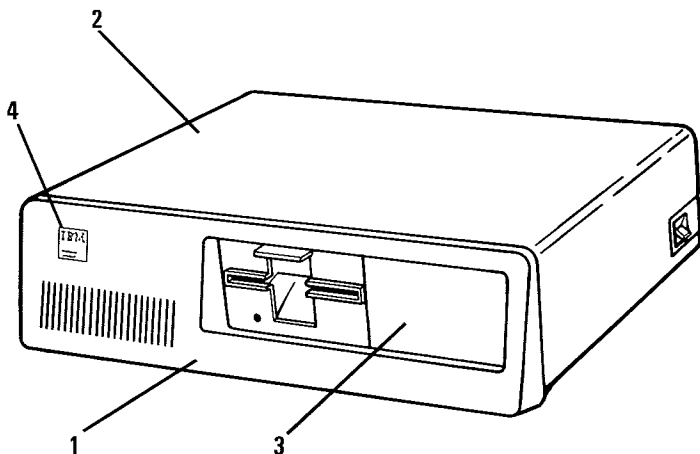


Figure 1 System Unit (5150)

Major Unit Code	Figure Index Number	Part Number	Description
000	1-1	8529163	Bezel Assembly
000	1-2	8654209	Top Cover (No Bezel)
000	1-2	8529162	Cover Assembly
000	1-3	8529204	Disk Cover Plate
000	1-4	8529164	Logo/Label Kit — Consisting of — Front Name Plate Rear Name Plate FCC Label

System Unit (5150)

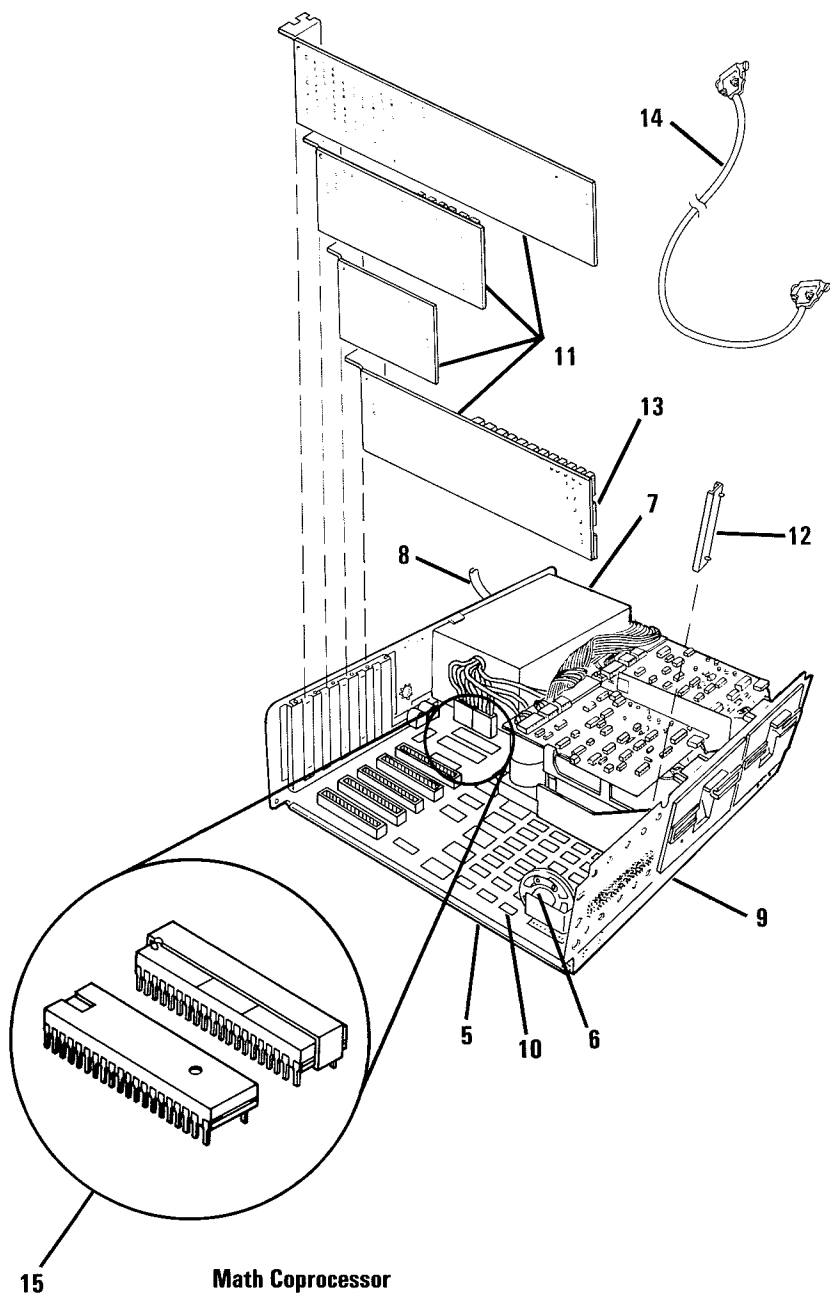


Figure 1. System Unit. (5150)

System Unit (5150)

Major Unit Code	Figure Index Number	Part Number	Description
311	1-5	8529205	System Board (16KB-64KB CPU)
311	1-5	8529238	System Board (16KB-64KB CPU) with 64KB installed.
311	1-5	8654213	System Board (64KB-256KB CPU)
000	1-6	8529143	Speaker and Cable
600	1-7	8529155	Power Supply
600	1-8	8529158	Line Cord
000	1-9	8529161	Base Assembly
301	1-10	8529142	16KB Memory Module (Qty. 1)
302	1-10	8529211	64KB Memory Module (Qty. 1)
000		8529165	Misc. Parts Kit — Consisting of — Screw-Flange Clip-Bezel Clip-Blank Bezel Foot Pad-Keyboards Foot Pad-System Unit Screw-Flange
000	1-12	8529156	Card Support Bracket — Optional Parts —
303	1-11	8529144	32KB Memory Expansion Option
305	1-11	8529145	64KB Memory Expansion Option
307	1-11	8529148	IBM Monochrome Display & Printer Adapter
309	1-11	8529146	Color/Graphics Monitor Adapter
317	1-11	8529149	Printer Adapter
100	1-11	8529150	Asynchronous Communications Adapter
315	1-11	8529151	Game Control Adapter
313	1-11	8529152	5 1/4" Diskette Drive Adapter
350	1-11	8529213	Prototype Card
319	1-11	8529212	64/256KB Memory Expansion Option Card (Does not include 64KB Memory Modules.)
102	1-11	8529295	Synchronous Data Link Control (SDLC) Communications Adapter
312	1-11	8529252	Extender Card
106	1-11	8529296	Binary Synchronous Communications (BSC) Adapter
321	1-13	8529211	64KB Memory Module (Qty. 1)
104	1-14	8529274	Communications Adapter Cable
326	1-15	8529147	Math Coprocessor and 8088 Processor

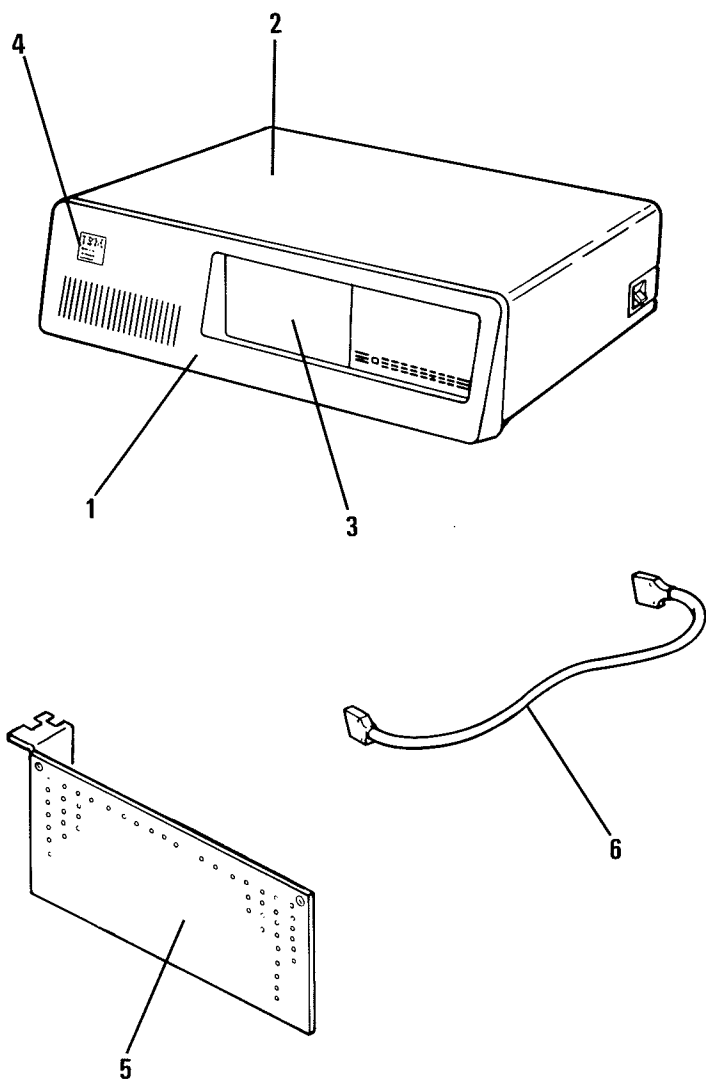


Figure 2 Expansion Unit (5161)

Expansion Unit (5161)

Major Unit Code	Figure Index Number	Part Number	Description
000	2-1	8529163	Bezel Assembly
000	2-2	8529162	Cover Assembly
000	2-3	8529204	Disk Cover Plate
000	2-4	8529164	Logo/Label Kit – Consisting of – Logo Rear Name Plate FCC Label
312	2-5	8529252	Extender Card (Must be installed in System Unit).
316	2-6	8529253	Expansion Unit Cable

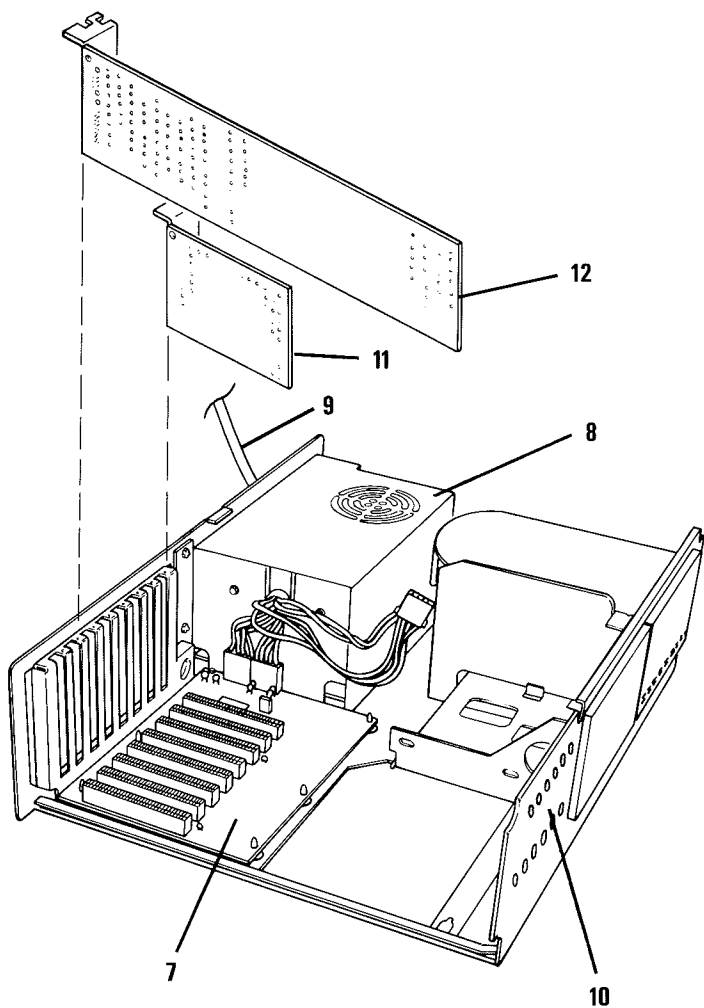


Figure 2 Expansion Unit (5161)

Expansion Unit (5161)

Major Unit Code	Figure Index Number	Part Number	Description
311	2-7	8529250	Expansion Board
600	2-8	8529247	Power Supply
600	2-9	8529158	Line Cord
000	2-10	8529248	Base Assembly
314	2-11	8529251	Receiver Card
325	2-12	8529269	Fixed Disk Adapter

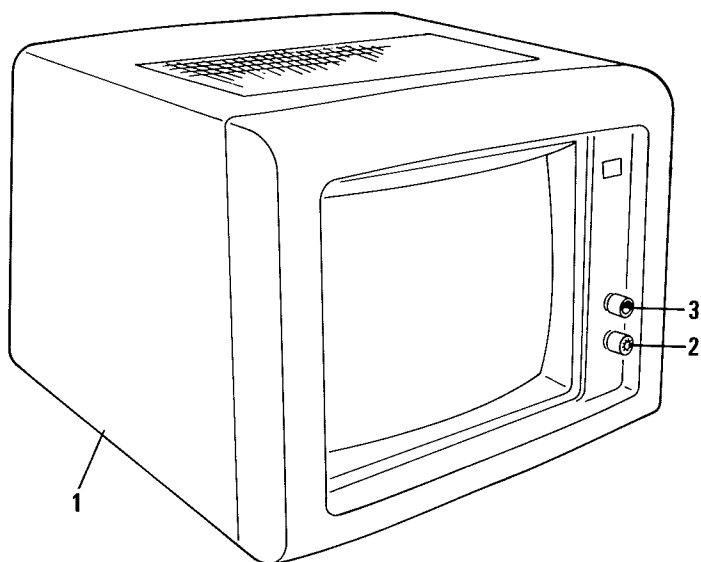


Figure 3 Monochrome Display (5151)

Monochrome Display (5151)

Major Unit Code	Figure Index Number	Part Number	Description
200	3-1	8529171	Display Assembly
200	3-2	8529177	Brightness Knob
200	3-3	8529178	Contrast Knob
200		8529179‡	Logo/Label Kit – Consisting of – Front Name Plate Label-FCC Label-Caution Rear Name Plate
		8529229‡	Front Panel
		8529230‡	Back Cover
		8529231‡	Upper Cover Plug
		8529232‡	Foot
		8529176‡	Power Cord Holder
		8529173‡	Signal Cable
		8529235‡	Transformer
		8529237‡	Control Support
		8529236‡	Transformer Support
		8529175‡	Fuse
		8529233‡	Analog Card
		8529234‡	PC Card
		8529174‡	Power Cord
		8529180‡	Display Misc. Hardware Kit – Consisting of – Display CRT Mounting Screw Display Transformer Screw Display CRT Mounting Support Display CRT Bracket to Front Panel Display Transformer Support Front Panel Display Rubber Bushing Screw Display Rubber Bushing Nut Display Cable Restraint Screw Display Star Washer
			‡Restricted availability.

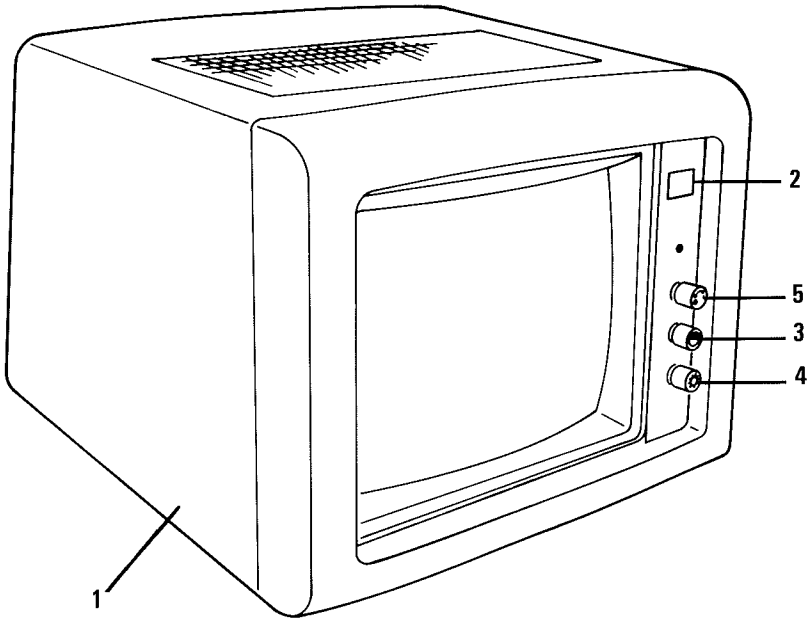


Figure 4 Color Display (5153)

Color Display (5153)

Major Unit Code	Figure Index Number	Part Number	Description
202	4-1	8529227	Display Assembly
202	4-2	8529339	Logo/Label Kit
202	4-3	8529287	Brightness Knob
202	4-4	8529288	Contrast Knob
202	4-5	8529289	Power On/Off Knob
202	4-6	8529158	Power Cord
		8529285‡	Front Cover with Top, Bottom, and Power Supply Brackets
		8529286‡	Rear Cover
		8529323‡	P.C. Board/Flyback Transformer
			Focus Pack/Horizontal Drive Transistor/Chassis
		8654275‡	Degaussing Coil
		8529338‡	Control Assembly
		8654276‡	Power On Indicator
		8529291‡	Power Supply Assembly
		8529290‡	CRT and Yoke
		8529324‡	CRT Drive Board and Shield Cable
		8529334‡	Signal Cable
		8529336‡	Power Receptacle/Line Filter Assembly
		8529335‡	Vertical Size Pot Shaft Extension
		8529337‡	Vertical Hold Pot Shaft Extension
		8529327‡	Misc. Hardware Kit
			— Consisting of —
			Driver Board Shield
			Driver Board Shield Retainers
			Signal Cord Strain Relief
			Power Supply Screws
			CRT Mounting Screws
			CRT Mounting Washers
			Control Assembly Screws
			P.C. Board Chassis Mounting Screws
			Rear Cover Screws and Washers
			Cover Screw Plugs
			Degaussing Coil Wire Ties
		6937192‡	Packing Material Kit
			‡Restricted availability

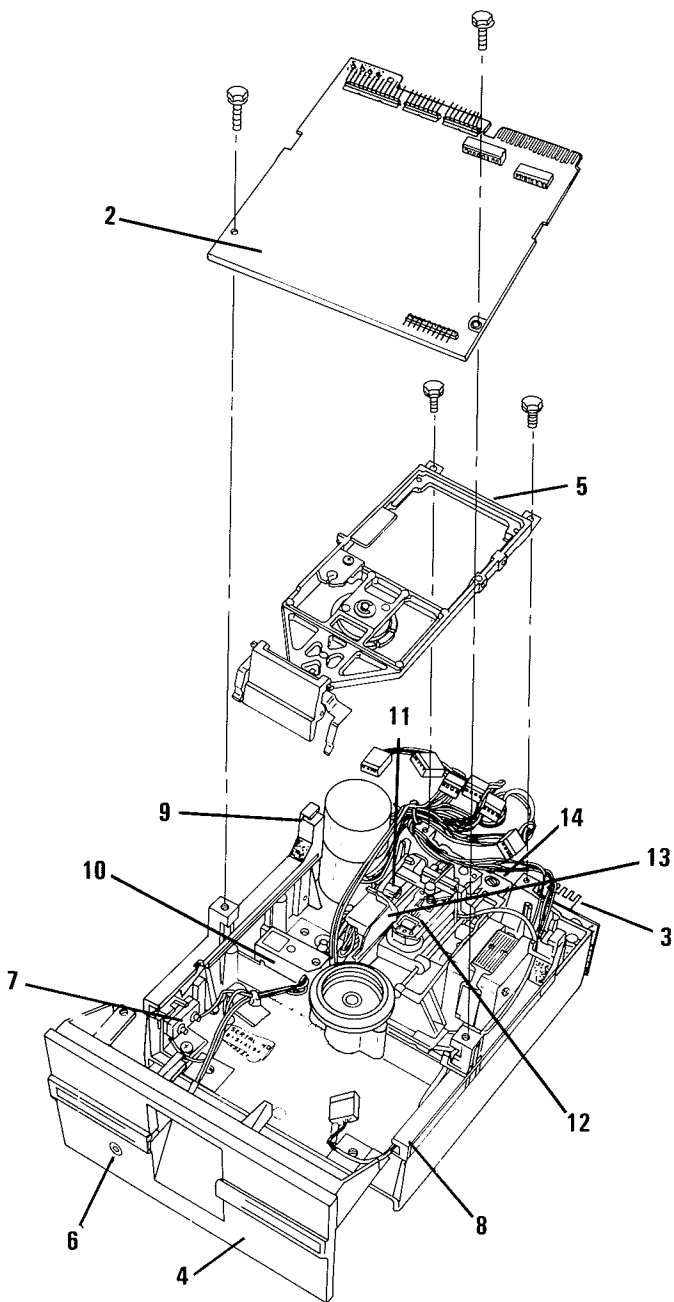


Figure 5 Diskette Drive Type 1

Diskette Drive Type 1

Use only in drives that have an A or B or no prefix in front of the serial number. The serial number is visible from the top of the drive.

Major Unit Code	Figure Index Number	Part Number	Description
827	1	8529153	Diskette Drive Assembly/160KB
830	1	8529206	Diskette Drive Assembly/320KB
827	2	8529226	Diskette Drive Logic Printed Circuit Board
827	3	8529256	Servo Board
827	4	8529293	Front Panel
827	5	8529267	Cone Lever Assembly – Consisting of – Cone Lever Arm Cone Assembly Mounting Clips Latch Assembly
827	6	8529258	LED Assembly
827	7	8529225	Write Protect Switch
827	8	8529261	Guide Right
827	9	8529262	Guide Left
827	10	8529257‡	Index Assembly
827	11	8529224‡	Track 0 Switch
827	12	8529264‡	Module SSR/160KB
830	12	8529210‡	Module DSR/320KB
827	13	8529265‡	SSR Upper Arm
827	14	8529266‡	Track 0 Stop
‡Restricted availability			

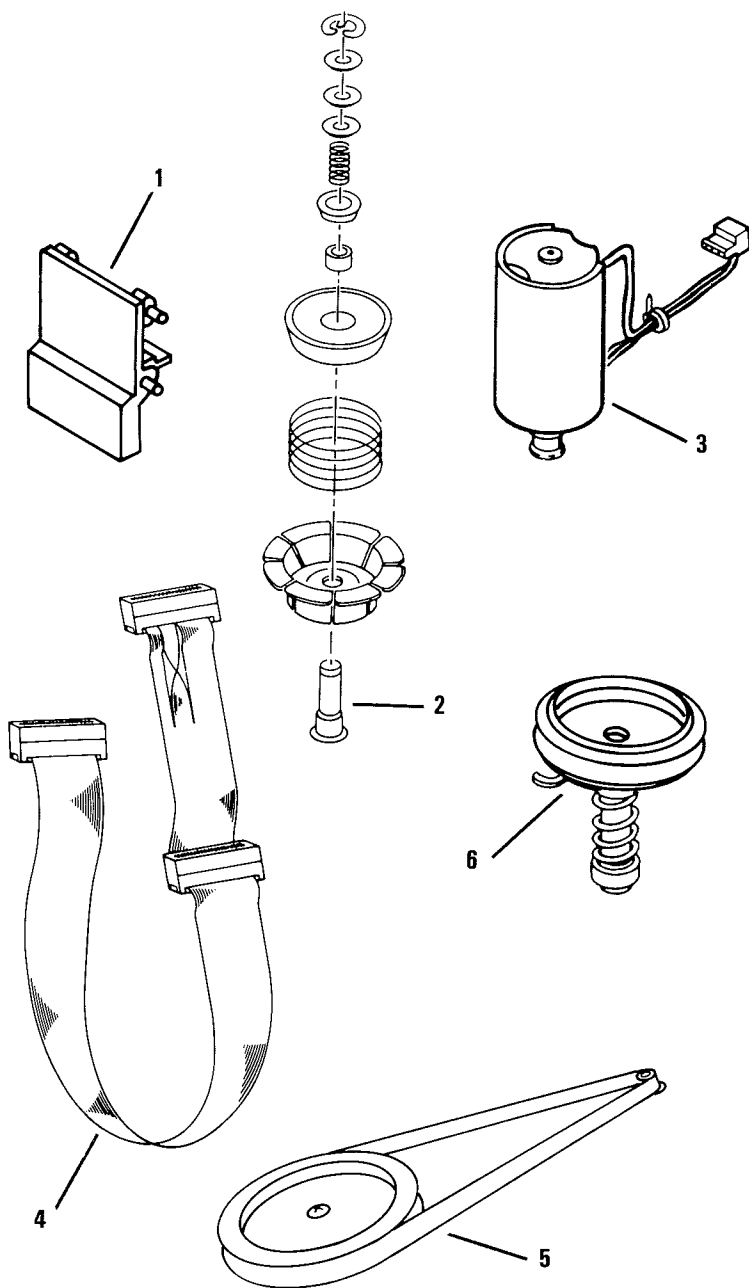


Figure 5 Diskette Drive Type 1

Diskette Drive Type 1

Use only in drives that have an A or B or no prefix in front of the serial number. The serial number is visible from the top of the drive.

Major Unit Code	Figure Index Number	Part Number	Description
827	1	8529260	Latch Assembly
827	2	8529259	Cone
827	3	8529223	Diskette Drive Motor
827	4	8529159	Signal Cable
827	5	8529154	Diskette Drive Belt
827	6	8529263	Spindle Assembly – Consisting of – Spindle Bearings Spring Sleeve
827		8529294	Misc. Parts Kit – Consisting of – Servo Board Spacer Cone Shaft E Ring Cone Shaft Washers Front Panel Bushings Drive Motor Shouldered Washer Track O Adj. Switch Screw Track O Adj. Switch Screw E Carrier Ecc. Stud Carrier Ecc. Stud E Ring ‡Restricted Availability

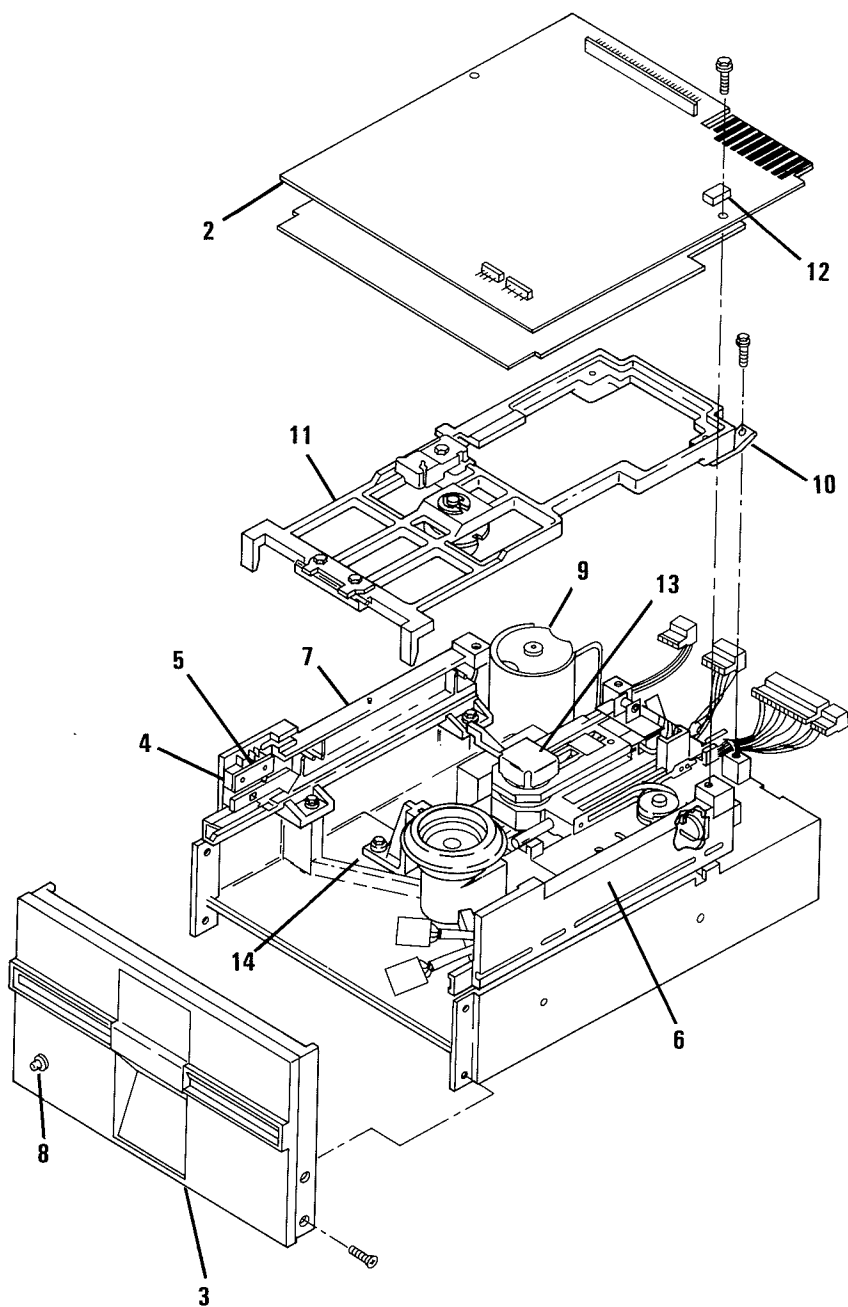


Figure 5 Diskette Drive Type 2

Diskette Drive Type 2

Use only in drives that have a D in front of the serial number. The serial number is visible from the top of the drive.

Major Unit Code	Figure Index Number	Part Number	Description
872	1	8529206	Diskette Drive/320KB
872	2	8654241	Logic Board
872	3	8654254	Front Panel
872	4	8654250	Write Protect Switch
872	5	8654260	Nut Plate (write protect)
872	6	8654245	Guide Right
872	7	8654244	Guide Left
872	8	8654249	LED Assembly
872	9	8654240	Drive Motor
872	10	8654261	Leaf Spring
872	11	8654243	Cone Lever Arm Assembly
872	12	8654252‡	Shunt, Dip
872	13	8654239‡	Module DSR/320KB
872	14	8654255‡	Index Housing (lower)
872		8654259	Misc. Parts Kit
			– Consisting of –
			Screws
			Washers
			Set Screws
			Pin Clamps
			‡Restricted availability

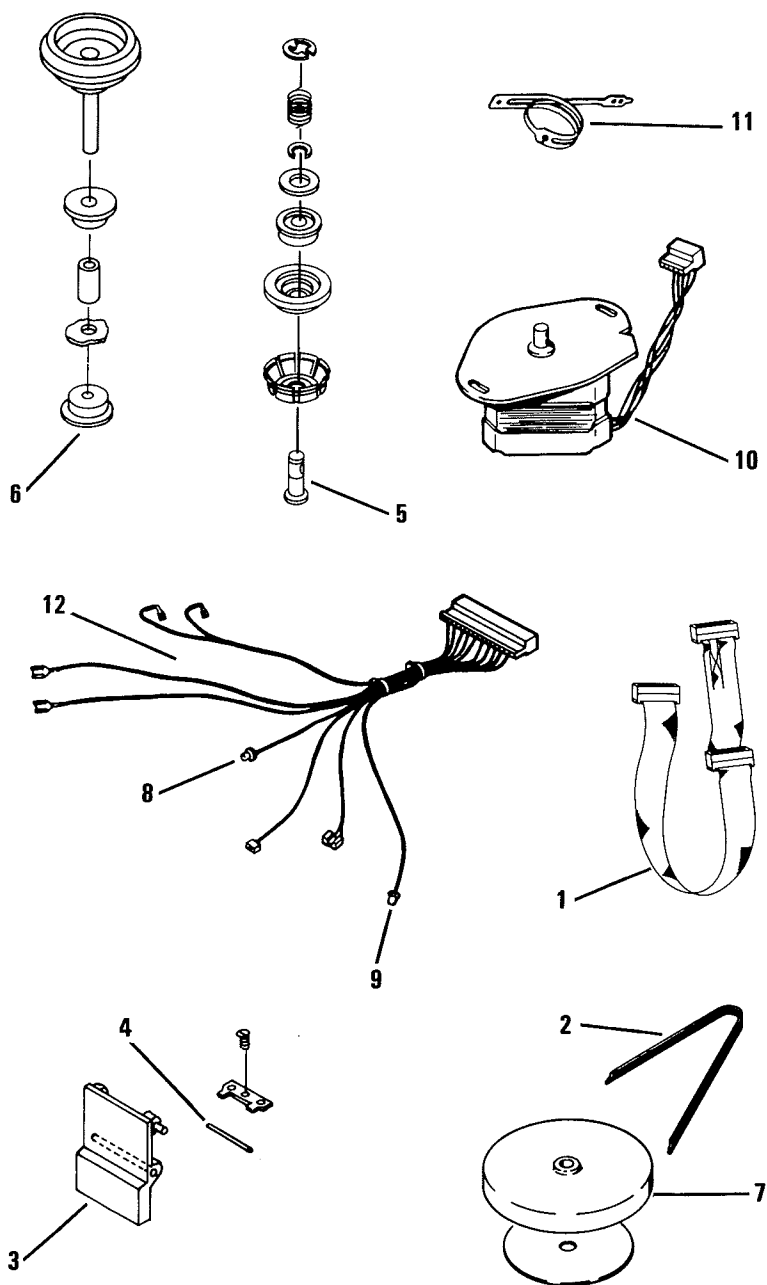


Figure 5 Diskette Drive Type 2

Diskette Drive Type 2

Use only in drives that have a D in front of the serial number. The serial number is visible from the top of the drive.

Major Unit Code	Figure Index Number	Part Number	Description
872	1	8529159	Diskette Drive Signal Cable
872	2	8654251	Diskette Drive Belt
872	3	8654242	Latch
872	4	8654262	Latch Pin
872	5	8654258	Cone Assembly
			– Consisting of –
872			Retaining Clip
872			Washer, Special
872			Spring
872			Washer
872			Clip
872			Bearing
872			Insert
872			Cone
872			Cone Shaft
872	6	8654256	Spindle Assembly
			– Consisting of –
			Bearings
			Washer
			Spindle
872	7	8654257	Pulley Kit
			– Consisting of –
			Pulley
			Disk (strobe)
872	8	8654247‡	Index Sense (upper)
872	9	8654248‡	Index Sense (lower)
872	10	8654237‡	Stepper Assembly (motor)
872	11	8654238‡	Band (head)
872	12	8654253‡	Index Harness
			‡Restricted availability

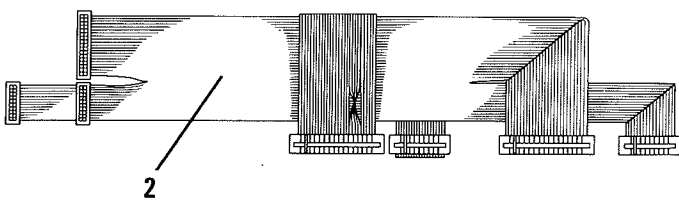
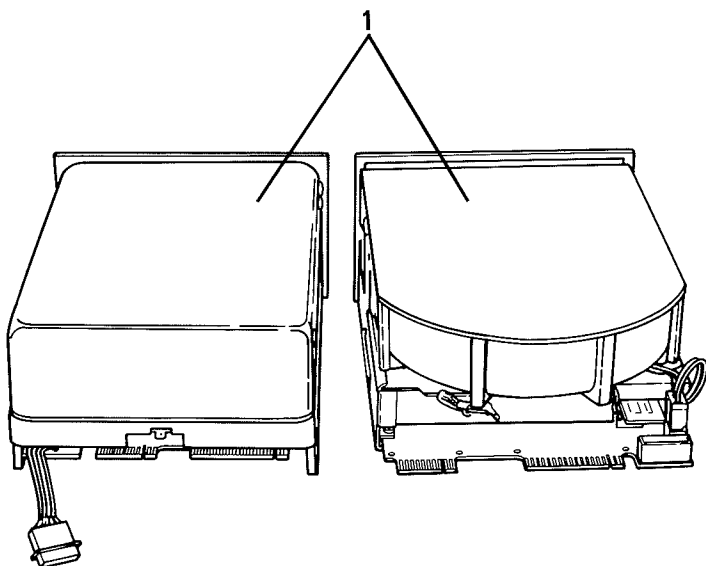


Figure 6 Fixed Disk Drive

Fixed Disk Drive

Major Unit Code	Figure Index Number	Part Number	Description
865	6-1	8529268	Fixed Disk Drive
865	6-2	8529271	Data/Control Cable

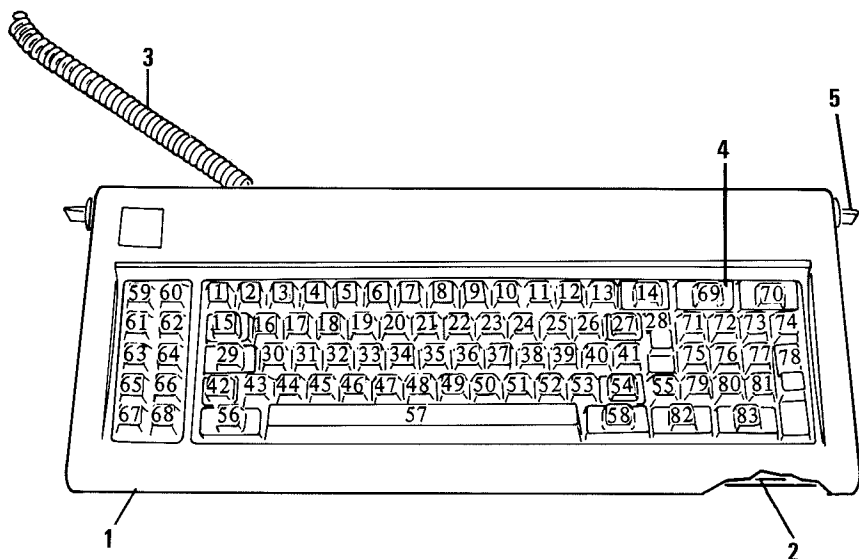


Figure 7 Keyboard

Keyboard

Major Unit Code	Figure Index Number	Part Number	Description
040	7-1	8529170	Cover Assembly
040	7-2	8529169	Base Assembly
040	7-3	8529168	Cable Assembly
040	7-4	8529166	Keyboard Assembly
040	7-5	8529157	Adjustable Foot (Adjustable Foot Spring included in Miscellaneous Parts Kit for System Unit)

Keybutton Part Numbers

(Major Unit Code 040)

Key Location	Part Number	Description	Key Location	Part Number	Description
1	4584714	Esc	43	5997221	!/\
2	1761460	! 1	44	2658860	Z
3	1642308	@ 2	45	2658861	X
4	1642309	# 3	46	2658862	C
5	1642342	\$ 4	47	2658863	V
6	1642343	% 5	48	2658864	B
7	4496183	^ 6	49	2658865	N
8	2658824	& 7	50	2658866	M
9	2658825	* 8	51	1864026	< .
10	2658826	/9	52	1864027	> .
11	2658827	/0	53	2658869	?
12	1761515	- -	54	2658870	⏏
13	2658829	+ =	55	4584718	PrtSc
14	1643315	←	56	1643330	Alt
15	1643316	← →	57	N/A	SPACE BAR
16	2658832	Q	58	4584719	Caps Lock
17	2658833	W	59	4584720	F1
18	2658834	E	60	4584721	F2
19	2658835	R	61	4584722	F3
20	2658836	T	62	4584723	F4
21	2658837	Y	63	4584724	F5
22	2658838	U	64	4584725	F6
23	2658839	I	65	4584726	F7
24	2658840	O	66	4584727	F8
25	2658841	P	67	4584728	F9
26	4585286	{ /	68	4584729	F10
27	4585288	} /	69	4584730	Num Lock
28	5184235	←	70	4584731	Scroll Lock
29	4584717	CTRL	71	4584732	7/Home
30	2658846	A	72	4584733	8/↑
31	2658847	S	73	4584734	9/Pg Up
32	2658848	D	74	1761511	-
33	2658849	F	75	4584735	4/←
34	2658850	G	76	2658892	5
35	2658851	H	77	4584736	6/→
36	2658852	J	78	1761513	+
37	2658853	K	79	4584737	1/End
38	2658854	L	80	4584739	2/↓
39	2658855	;/	81	4584738	3/Pg Dn
40	4584779	" ,	82	4584740	0/Ins
41	1642306	~ _	83	4584741	./Del
42	2658858	⏏			

For a complete set of key buttons order Part No. 4584657

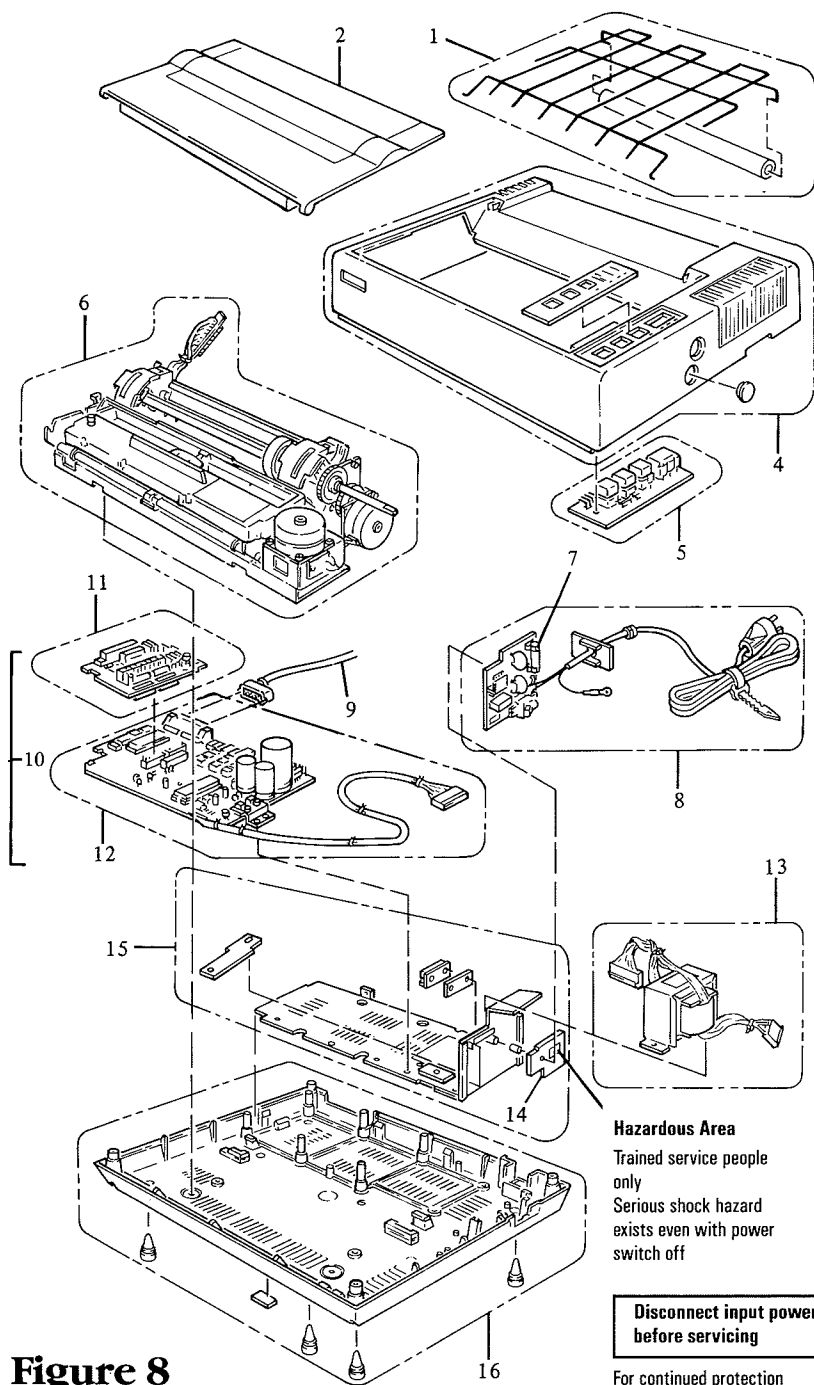


Figure 8
Printer (5152)

Matrix Printer (5152)

Major Unit Code	Figure Index Number	Part Number	Description
554	8-1	8529191	Forms Rack
000	8-2	8529185	Access Cover
000	8-3	8529186	Logo/Label Kit — Consisting of — Control Panel Label Nameplate Logo-Front Nameplate Logo-Rear Warning Label Bottom Label-FCC Warning Label-Safety Shield 1 ea. 120, 220, 240 Label-Rear
000	8-4	8529182	Top Cover
000	8-5	8529184	Control Panel
551	8-6	8529198	Print Mechanism Assembly
600	8-7	8529220	Fuse-2A
600	8-8	8529187	Fuse-Filter Card/Power Cord
551	8-9	8529214	Printer Cable
318	8-10	8529268	Control Cards, Graphics Printer — Consisting of —
318	8-11	8529221‡	Driver Card
318	8-12	8529276‡	Logic Card
318	8-10	8529197‡	Control Cards, Matrix Printer — Consisting of —
318	8-11	8529221‡	Driver Card
318	8-12	8529222‡	Logic Card
600	8-13	8529196	Power Transformer
600	8-14	8529215	Safety Shield
600	8-15	8529217	Heatsink/Power Transistor
000	8-16	8529181	Base Assembly
			‡Restricted availability

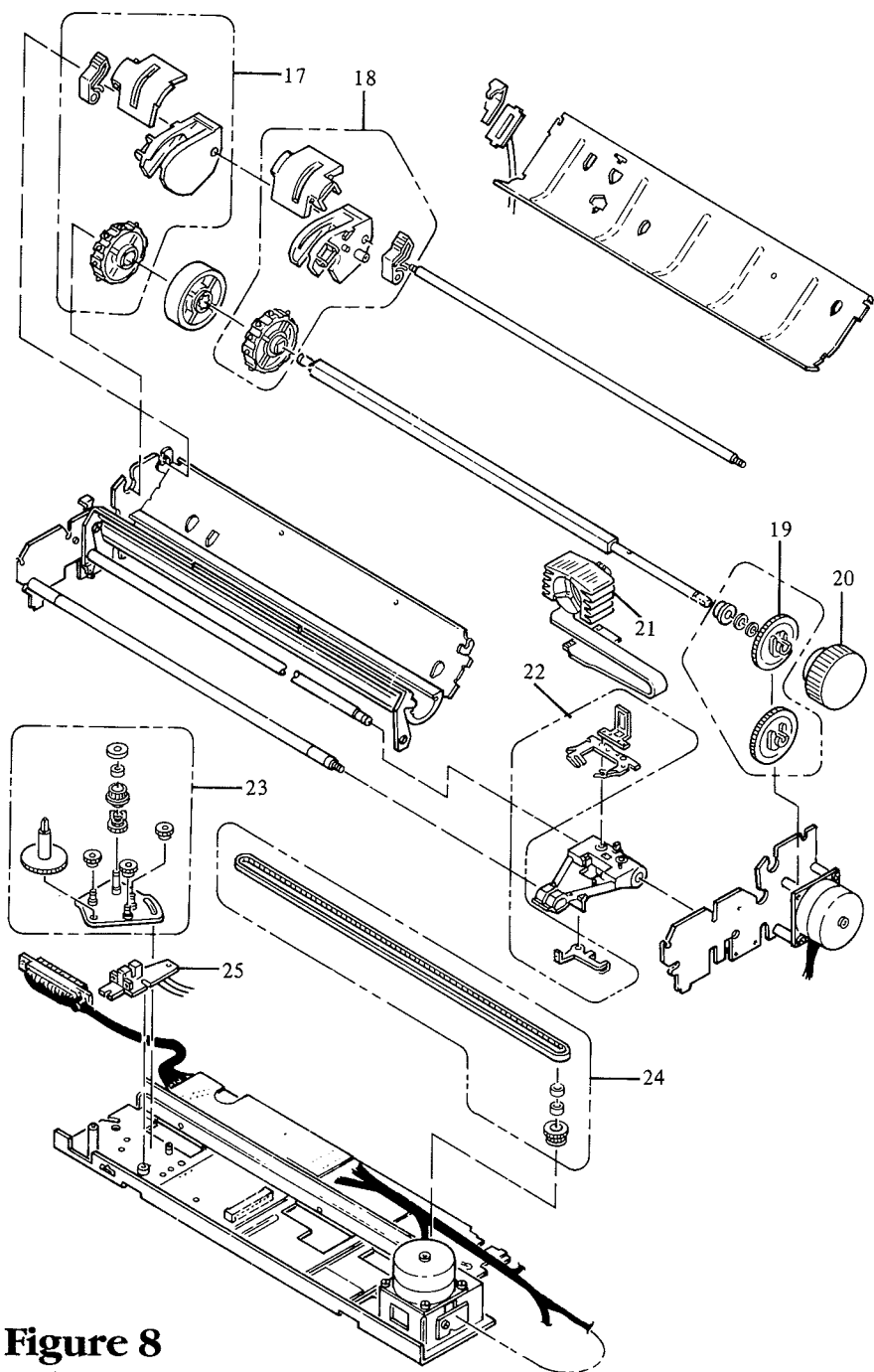


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Matrix Printer (5152)

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550	8-17	8529188	Forms Tractor Assembly, Left
550	8-18	8529216	Forms Tractor Assembly, Right
550	8-19	8529194	Intermediate Gear
550	8-20	8529193	Forms Feed Knob
551	8-21	8529183	Print Head
551	8-22	8529192	Ribbon Shield
551	8-23	8529195	Carriage Drive Assembly
551	8-24	8529190	Carriage Belt
551	8-25	8529189	Left Margin Assembly
000		8529200	Printer Misc Hardware — Consisting of — Plane Washers C.T.P. Screws Retaining Rings, Type E CP Screws with OW Cup Screws Spacers Outside Toothed Lock Washers CP Screws with SW Cup Screws (Binding Head) Hexagon Nuts CB Screws
000		8529218	Printer Misc Springs — Consisting of — Spring Pin Leaf Spring Leaf Spring PE Lever Spring Headlock Lever Spring Scale Spring, Left Scale Spring, Right Paper Holding Cover Spring
000		8529219	Printer Misc Parts — Consisting of — Board Spacing Paper Guide Roller Grommet Rubber Bumper A Rubber Bumper B Wire Band

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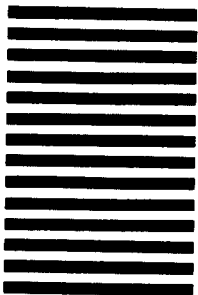
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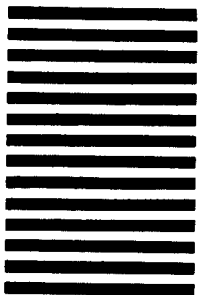
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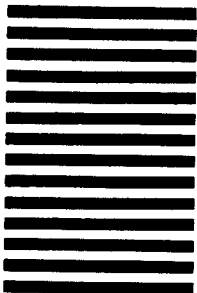
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